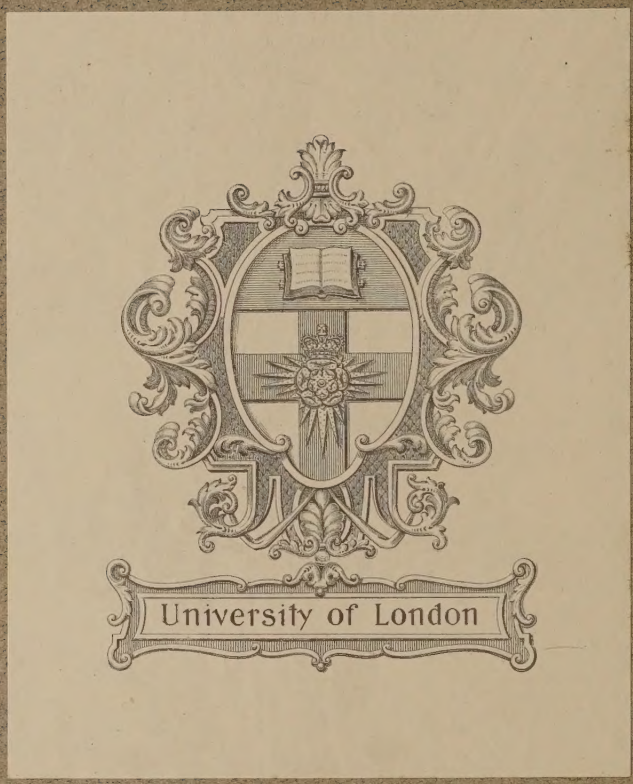
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REPORTS

FROM

COMMITTEES:

ELEVEN VOLUMES.

— (7.) —

PRIVATE BILLS (COMMITTEE OF SELECTION);
RAILWAY AND CANAL BILLS;
RAILWAY COMPANIES' BORROWING POWERS;
RAILWAY COMPANIES' POWERS;
RAILWAY SCHEMES (METROPOLIS);
METROPOLITAN SUBWAY BILL.

Session

4 *February*—— 29 *July* 1864.

VOL. XI.

1864.

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1864.

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SEVENTH VOLUME.

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FIRST REPORT

FROM THE

COMMITTEE OF SELECTION

RELATIVE TO THE

GROUPING OF PRIVATE BILLS.

CLASSIFICATION OF PRIVATE BILLS.

The Committee of Selection have formed the following Private Bills into Groups, and have agreed to Report the same to the House:

GROUP A.

Ashton-under-Lyne and Staleybridge Water.
Wrexham Water.
Lancaster Local Board of Health.
Whitby Water.
North Cheshire Water.
Chorley Local Board of Health.
Stockport District Water.
Stockton and Middlesbrough Water.

GROUP B.

Chertsey Gas.
Chertsey District Gas.
Dover Gas.
Huntingdon and Godmanchester Gas.
Ipswich Gas.
Tunbridge Wells Gas.
Lea Bridge Gas.
Northfleet Gas.

GROUP C.

Holborn Valley Improvement.
Metropolitan Meat and Poultry Market.
Southwark and Vauxhall Water.
Southwark Park.
Thames Embankment (South Side).
South Kensington New Road.

GROUP D.

Bolton Improvement.
Harwich Corporation.
Belfast Water.
Belfast Improvement.
Dublin Improvement.
St. Stephen's Green, Dublin.
Londonderry Improvement.

GROUP E.

Liverpool Improvement.
Liverpool Sanitary.
Edinburgh and Leith Sewerage.
Scarborough Valley Bridge.

GROUP F.

Pontypridd Water.
Stirling Water.
Exmouth and Budleigh Salterton Water.
Matlock Bath Water.
Folkestone Water.
Haslingden and Rawtenstall Water.
Chiltern Hills Water.
South Staffordshire Water.

GROUP G.

Wallasey Embankment.
Wallasey Embankment (Power for the Commissioners, &c.)
Wallasey Improvement.
Mersey Docks and Harbour Board.

GROUP H.

Aberbrothwick Harbour.
Downs (The) Docks.
Greenwich and South Eastern Docks.
Hartlepool Port and Harbour.
Hull Docks.
Llanelly Harbour.

GROUP J.

Brough Ferry Road.
Argyllshire Roads.
Peebleshire Roads.
Moira and Gresley Road.
Kirkcudbright Stewartry Roads.
Zetland Roads.
Newcastle-upon-Tyne and North Shields Road.
Mytholm Royd Bridge and Blackstone Edge Road.
Bolton and St. Helen's Road.

GROUP K.

Andover and Chilton Pond Road.
Helston Roads.
Portmadoc and Beaver Pool Bridge Road.
Thornset Road.
Stockport and Ashton Roads.
Sudden Bridge and Bury Roads.
Pucklechurch Roads.
Chesterfield and Hernstone Lane Head Road.
Hedon and Patrington Road.
Newport (Monmouthshire) Turnpike Trust.

FIRST REPORT FROM THE COMMITTEE OF SELECTION.

Ordered, by The House of Commons. *to be Printed,*
17 *February* 1864.

SECOND REPORT

FROM THE

COMMITTEE OF SELECTION

RELATIVE TO THE

GROUPING OF PRIVATE BILLS.

CLASSIFICATION OF PRIVATE BILLS.

THE COMMITTEE OF SELECTION have formed the following Private Bills into a Group, and have agreed to Report the same to the House:

GROUP L.

Newcastle-upon-Tyne and Gateshead Gas.
Salisbury Gas.
Wisbech Water.
Hertford Gas.
Nottingham Gas.
Bolton Gas.

COMMITTEE OF SELECTION.

SECOND REPORT

FROM THE

COMMITTEE OF SELECTION.

Ordered, by The House of Commons, *to be Printed,*
4 *March* 1864.

62—I.

THIRD REPORT

FROM THE

COMMITTEE OF SELECTION

RELATIVE TO THE

GROUPING OF PRIVATE BILLS.

CLASSIFICATION OF PRIVATE BILLS.

THE COMMITTEE OF SELECTION have made the following alterations in the Groups of Private Bills already formed, and have formed additional Groups, which they have agreed to Report to the House:

GROUP D.

They have added the

Brokers' Bonds and Rents.

Colne Fishery.

They have withdrawn the

Belfast Water (Commissioners),

Belfast Improvement (No. 2),

Dublin Improvement,

St. Stephen's Green, Dublin,

Londonderry Improvement,

and have formed such last-named Bills into a new Group—Group M.

GROUP E.

They have added the

Liverpool and London Fire and Life Insurance and Globe Insurance Companies.

They have formed the following additional Group—

GROUP N.

Chichester Harbour Embankment.
Clyde Navigation.
Isle of Wight Ferry.

COMMITTEE OF SELECTION.

THIRD REPORT FROM THE COMMITTEE OF SELECTION.

Ordered, by The House of Commons, *to be Printed,*
11 *March* 1864.

62—II.

Under 1 *oz.*

FOURTH REPORT

FROM THE

COMMITTEE OF SELECTION

RELATIVE TO THE

GROUPING OF PRIVATE BILLS.

CLASSIFICATION OF PRIVATE BILLS.

THE COMMITTEE OF SELECTION have made the following alterations in the Groups of Private Bills already formed, and have agreed to Report the same to the House:

GROUP M.

They have withdrawn the

Dublin Improvement.

St. Stephen's Green (Dublin).

GROUP N.

They have withdrawn the

Clyde Navigation,

and have added the

Dublin Improvement.

St. Stephen's Green (Dublin).

COMMITTEE OF SELECTION.

FOURTH REPORT FROM THE COMMITTEE OF SELECTION.

Ordered, by The House of Commons, *to be Printed,*
2 *May* 1864.

FIFTH REPORT

FROM THE

COMMITTEE OF SELECTION

RELATIVE TO THE

GROUPING OF PRIVATE BILLS.

CLASSIFICATION OF PRIVATE BILLS.

The Committee of Selection have made the following alteration in the Groups of Private Bills already formed, and have agreed to Report the same to the House:

GROUP N.

They have added the

Globe Telegraph Company [*Lords*].

FIFTH REPORT FROM THE COMMITTEE OF SELECTION.

Ordered, by The House of Commons, *to be Printed,*
10 *May* 1864.

SIXTH REPORT

FROM THE

COMMITTEE OF SELECTION

RELATIVE TO THE

GROUPING OF PRIVATE BILLS.

CLASSIFICATION OF PRIVATE BILLS.

THE COMMITTEE OF SELECTION have formed the following additional Group, and have agreed to Report the same to the House:

GROUP O.

London (City) Tithes.
Sheffield Waterworks (Bradfield Inundation).
Pneumatic Despatch Company [*Lords*].
Shrewsbury Bridge [*Lords*].
Railway Passengers Assurance Company [*Lords*].
West London Docks and Warehouses [*Lords*].
North Kent and Kent Water [*Lords*].

COMMITTEE OF SELECTION.

SIXTH REPORT

FROM THE

COMMITTEE OF SELECTION.

Ordered, by The House of Commons, *to be Printed,*
31 *May* 1864.

SEVENTH REPORT

FROM THE

COMMITTEE OF SELECTION

RELATIVE TO THE

GROUPING OF PRIVATE BILLS.

CLASSIFICATION OF PRIVATE BILLS.

THE COMMITTEE OF SELECTION have formed the following additional Group, and have agreed to Report the same to the House:

GROUP P.

Wandsworth Bridge [*Lords*].
Birmingham and Staffordshire Gas [*Lords*].
Herne Bay and Reculver Fishery [*Lords*].
Hubberston Docks [*Lords*].
Exmouth Docks [*Lords*].

SEVENTH REPORT

FROM THE

COMMITTEE OF SELECTION.

Ordered, by The House of Commons, *to be Printed,*
24 *June* 1864.

FIRST REPORT

FROM THE

GENERAL COMMITTEE

ON

RAILWAY AND CANAL BILLS.

THE GENERAL COMMITTEE on RAILWAY and CANAL BILLS have formed the following Bills into Groups, and have agreed to report the same to The House :—

Group 1.

Read 2°.

Blackfriars Embankment, Roadway, and Railway.
Charing Cross Railway.
Charing Cross Northern Railway.
Charing Cross Western Railway.
East London Railway.
Great Eastern Railway (Metropolitan Station and Railways).
Great Northern and Victoria Station Railway.
Great Northern Railway (No. 1) (Barnet Branch, &c.)
Hampstead, Midland, North Western, and Charing Cross Junction Railway.
London and Blackwall Railway.
London, Brighton, and South Coast Railway (Additional Powers).
London, Brighton, and South Coast Railway (New Lines in Battersea).

15 Feb. London, Chatham, and Dover Railway (No. 1).
London, Chatham, and Dover Railway (No. 2) (New Lines, &c.)
London Low Level Railway.
London Main Trunk Underground Railway.
London Union Railways.
Metropolitan Railway (Additional Powers).
Metropolitan Railway (Notting Hill, and Brompton Extension).
Metropolitan Railway (Trinity Square Extension).
Metropolitan and St. John's Wood Railway.
Metropolitan District Railways.
Metropolitan Grand Union Railway.
Midland Railway (St. Pancras Branch).
North London Railway (Additional Powers).
North London Railway (Kingsland and Tottenham Line).
North and South London (High Level) Junction Railway.
North and South London Railways Junction.
Oxford Street and City Railway.

Read 2°.

Paddington and Charing Cross Railway.
Thames Tunnel Railway.
Thames Viaduct Railway.
Tottenham and Farringdon-street Railway.
Tottenham and Hampstead Junction Railway (Extension to Charing Cross).
Victoria Station and Thames Embankment Railway.
Walthamstow, Clapton, and City Railway.

Group 2.

15 Feb. Crystal Palace and South London Junction Railway.
Crystal Palace New Railways.
15 Feb. Edgware, Highgate, and London Railway.
15 Feb. Finchley, Willesden, and Acton Railway.
16 Feb. Hammersmith and City Railway.
16 Feb. Hammersmith and Wimbledon Railway.
Kew, Turnham Green, and Hammersmith Railway.
Kingston, Tooting, and London Railway.
15 Feb. London and South Western Railway (Kensington, &c.).
15 Feb. North and South Western Junction Railway.
Tooting, Merton, and Wimbledon Extension Railway.
15 Feb. Tottenham and Hampstead Junction Railway (Alexandra Park Extensions).
15 Feb. Watford and Edgware Junction Railway.
16 Feb. Wood Green and Enfield Railway.

Group 3.

15 Feb. Dover, Deal, and Sandwich Railway.
15 Feb. Kent Coast Railway.
London, Chatham, and Dover Railway (No. 3) (Steamboats).
15 Feb. Maidstone and Ashford Railway.
Ramsgate Railway.
16 Feb. Sevenoaks, Maidstone, and Tunbridge Railway.
15 Feb. South Eastern Railway (No. 1).
15 Feb. South Eastern Railway (No. 3).
15 Feb. South Eastern Railway (No. 4).
15 Feb. Weald of Kent Railway.

Group 4.

15 Feb. Chichester and Midhurst Railway (No. 1).
Chichester and Midhurst Railway (No. 2).
15 Feb. Chichester and Midhurst Railway (No. 3).
16 Feb. London, Brighton, and South Coast Railway (Kemp Town Station and Lines).
16 Feb. London, Brighton, and South Coast Railway (Ouse Valley Line).
London, Brighton, and South Coast Railway (Steamboats).
16 Feb. London, Brighton, and South Coast Railway (Tunbridge Wells and Eastbourne Line).
Mayfield Railway.
Pulborough, Storrington, and Steyning Railways.
Reigate and London (West End Junction) Railway.
15 Feb. South Eastern Railway (No. 2).
Surrey and Sussex Junction Railways.
15 Feb. West Grinstead, Cuckfield, and Hayward's Heath Railway.
West Sussex Junction Railway.

Read 2°.

Group 5.

15 Feb. Alton, Alrewas, and Winchester Railway.
15 Feb. Farnham, Aldershot, and Woking Junction Railway.
Guildford and Leatherhead Railway.
15 Feb. Isle of Purbeck Railway.
London and South Western Railway (Additional Works).
15 Feb. London and South Western Railway (Chertsey Extension).
Petersfield and Bishops Waltham Railway.
Salisbury and Yeovil Railway.
Salisbury Railway and Market House.
Southampton and Netley Railway.
Staines, Egham, and Woking Junction Railway.
15 Feb. Sunningdale and Cambridge Town Railway.
Sunningdale, York Town, and Aldershot Railway.
15 Feb. West Drayton and Staines Railway.

Group 6.

Bristol and North Somerset Railway (Bath Extension).
Bristol and North Somerset Railway (Extensions).
15 Feb. Bristol and South Wales Union Railway.
Bristol Central Station and Railways.
Bristol Port and Channel Docks Railway.
15 Feb. Bristol Port Extension Railways
15 Feb. Calne Railway.
15 Feb. Midland Railway (Bath and Thornbury).
Somerset and Dorset Railway (Cheddar Valley and Yatton).
15 Feb. Somerset and Dorset Railway (Extension to Shepton Mallett).
15 Feb. Weston-super-Mare, Axbridge, Cheddar, and Wells Railway.

Group 7.

Bodmin, Wadebridge, and Cornwall Junction Railway.
15 Feb. Buckfastleigh, Totnes, and South Devon Railway.
Exe Valley Railway.
Ilfracombe Railway.
15 Feb. Kingsbridge Railway.
16 Feb. Launceston, Bodmin, and Wadebridge Junction Railway.
15 Feb. London and South Western Railway (North Devon Extension).
North Devon and Somerset Railway.
15 Feb. Okehampton Railway.
15 Feb. Tamar, Kit Hill, and Callington Railway.
Teign Valley Railway.
Torbay and Brixham Railway.
Totnes, Buckfastleigh, Ashburton, and Newton Junction Railway.

Group 8.

16 Feb. East Norfolk Railway.
15 Feb. Ely, Haddenham, and Sutton Railway.
15 Feb. Great Eastern Railway (Highbeech Branch).
Great Eastern Railway (Junctions).

Read 2°.

15 Feb. Great Eastern Railway (St. Ives to Ramsey).
15 Feb. Mistley, Thorpe, and Walton Railway.
15 Feb. Royston and Hitchin Railway.
15 Feb. Tendring Hundred Railway.
15 Feb. Wensum Valley Railway.
15 Feb. West Norfolk Junction Railway.

Group 9.

15 Feb. Alford and Mablethorpe Railway.
Great Eastern Northern Junction Railway.
15 Feb. Great Northern Railway (No. 2.) (Lincoln to Bourn).
16 Feb. Great Northern Railway (No. 3) (Doncaster to Gainsborough, &c.)
Lynn and Sutton Bridge Railway (Cross Keys Bridge).
15 Feb. Lynn and Sutton Bridge Railway (Transfer).
Manchester, Sheffield, and Lincolnshire Railway (Steamboats).
16 Feb. Peterborough, Wisbeach, and Sutton Railway.
Stamford and Essendine Railway.

Group 10.

15 Feb. Great Northern Railway, and Leeds, Bradford, and Halifax Junction Railway Amalgamation.
Halifax and Ovenden Junction Railway.
Halifax, Huddersfield, and Keighley Railway.
15 Feb. Lancashire and Yorkshire Railway (Additional Powers).
15 Feb. Leeds, Bradford, and Halifax Junction Railway (No. 1) (New Works).
Leeds, Bradford, and Halifax Junction Railway (No. 2).
15 Feb. North Eastern, Lancashire and Yorkshire, and West Yorkshire Railway Companies.
North Eastern Railway (Leeds Extension).
North Eastern Railway (Leeds New Central Station).
15 Feb. South Yorkshire Railway.
15 Feb. South Yorkshire Railway and River Dun Company's.
15 Feb. West Riding and Grimsby Railway.
15 Feb. West Yorkshire Railway.

Group 11.

15 Feb. Blyth and Tyne Railway (Additional Powers).
15 Feb. Blyth and Tyne Railway (New Works).
15 Feb. North Durham Railways.
15 Feb. North Eastern Railway (Additional Powers).
15 Feb. North Eastern Railway (York and Doncaster Branch.
Scarborough, Whitby, and Staithes Railway.
15 Feb. *Blyth Dock.*

Group 12.

15 Feb. Blackpool and Fleetwood Railway.
15 Feb. Garstang and Knot End Railway.
15 Feb. Lancashire and Yorkshire (Blackburn, &c., Lines).
15 Feb. The Lancashire Union Railways.
15 Feb. Lancaster Canal Transfer.

Read 2°.

15 Feb. Liverpool Central Station.
London, and North Western Railway (Additional Powers).
15 Feb. North Western Railway.
15 Feb. Ribblesdale Railway.
St. Helen's Canal and Railway.

Group 13.

Cannock Chase and Wolverhampton Railway.
16 Feb. Cheadle, Didsbury, and Manchester Railway.
15 Feb. Drayton Junction Railway.
15 Feb. Knutsford and Warrington Railway.
Macclesfield and Cheshire Midland Junction Railway.
15 Feb. Macclesfield and Knutsford Railway.
15 Feb. Macclesfield, Bollington, and Marple Railway.
15 Feb. Manchester, Sheffield, and Lincolnshire Railway.
15 Feb. Marple, New Mills, and Hayfield Junction Railway.
15 Feb. Nantwich and Market Drayton Railway.
15 Feb. Newcastle-under-Lyme Canal, and North Staffordshire Railway Companies.
North Staffordshire Railway (New Works).
15 Feb. North Staffordshire Railway (Silverdale, Madeley, and Drayton).
Shrewsbury and Potteries Junction Railway.
15 Feb. Tunstall Railway.
Wellington and Drayton Railway.

Group 14.

Central Wales and Staffordshire Junction Railway.
Oswestry, Ellesmere, and Whitchurch Railway.
Severn Valley Railway.
15 Feb. Shrewsbury and Welchpool Railway.
15 Feb. West Shropshire Mineral Railway (Branches, &c.).
West Shropshire Mineral Railway (New Lines).
Wolverhampton and Bridgnorth Railway.
15 Feb. Wrexham, Mold and Connah's Quay Railway.
15 Feb. Aberystwith and Welsh Coast Railway.
15 Feb. Aberystwith and Welsh Coast Railway (Steamboats).
15 Feb. Corris Railway or Tramroad.
15 Feb. Llanidloes and Newtown Railwa y
Manchester and Milford Railway.
Mid-Wales Railway.
Newtown and Machynlleth and Aberystwith and Welsh Coast Railways.
15 Feb. Oswestry and Newtown and other Companies (Amalgamation).
Oswestry and Newtown, London and North Western, and other Railway Companies.
15 Feb. Oswestry and Newtown Railway and other Companies (Arrangements).

Group 15.

15 Feb. Bourton-on-the-Water Railway.
15 Feb. East Gloucestershire Railway.
16 Feb. Gloucester and Ledbury Railway
Gloucester, Cheltenham, and Oxford Direct Railway.
Gloucestershire and Wiltshire Railway.
Great Western Railway.
16 Feb. Stonehouse and Nailsworth Railway.

Read 2°.

Tewkesbury and Malvern Railway.
15 Feb. Wilts and Gloucestershire Railway.
Witney Railway.
15 Feb. Worcester, Dean Forest, and Monmouth Railway.
15 Feb. Worcester, Bromyard, and Leominster Railway.

Group 16.

16 Feb. Aylesbury and Buckingham Railway.
15 Feb. Bedford and Cambridge Railway.
15 Feb. Blockley and Banbury Railway.
15 Feb. Chipping Norton and Banbury Railway.
15 Feb. East and West Junction Railway.
16 Feb. Henley-in-Arden Railway.
Market-Harborough and East Norton Railway.
15 Feb. Market-Harborough and Melton Mowbray Railway.
15 Feb. Midland Railway (Chesterfield to Sheffield) Railway.
15 Feb. Midland Railway (New Lines, &c.).
Newark and Mansfield Railway.
16 Feb. North and South Junction Railway.
16 Feb. Rickmansworth, Amersham and Chesham Railway.
15 Feb. Sheffield, Chesterfield, and Staffordshire Railway.
16 Feb. Wallingford and Watlington Railway.

Group 17.

Brecon and Merthyr Tydfil Junction Railway (No. 1).
15 Feb. Brecon and Merthyr Tydfil Junction Railway (No. 2).
15 Feb. Brecon and Merthyr Tydfil Junction Railway (No. 3).
Brecon and Merthyr Tydfil Junction Railway (Purchase, &c.)
15 Feb. Carmarthen and Cardigan Railway.
15 Feb. Carmarthenshire Railway.
Hereford, Hay and Brecon Railway.
15 Feb. Llanelly Railway and Dock Company (No. 1) (Capital).
15 Feb. Llanelly Railway and Dock Company (No. 2) (New Line).
15 Feb. Neath and Brecon Railway (New Lines, &c.)
15 Feb. Pembroke and Tenby Railway.
Rhymney Railway (Cardiff and Caerphilly, &c.)
15 Feb. Rhymney Railway Extension.
15 Feb. South Wales Mineral Railway.
South Wales, Tenby and Milford Haven Junction Railway.
Swansea and Oystermouth Railway.
15 Feb. Swansea Vale Railway.
15 Feb. Swansea Vale, and Neath and Brecon Junction Railway.
Neath and Brecon Railways (Extension, &c.)
15 Feb. Kington and Eardisley Railway.

Group 18.

Crieff and Methven Junction and Branch Railway.
15 Feb. Denburn Valley Railway.
15 Feb. Great North of Scotland Railway (No. 1).
15 Feb. North British Railway (Perth Branch).
15 Feb. Scottish Central Railway (Dundee and Newtyle Extension).
15 Feb. Scottish Central Railway (Stations, &c.)
15 Feb. Scottish North Eastern (Dundee and Forfar Line) Railway.
15 Feb. Scottish North Eastern and Alyth Railway Companies.

Read 2°.

15 Feb. Scottish North Eastern, and Perth Almond Valley and Methven Railways.
15 Feb. Scottish North Eastern and Scottish Central Railway Companies.
Caledonian Railway (Bredisholm and Tennochside Branch).
Dumfriesshire and Cumberland (Solway) Junction Railway.
15 Feb. Hamilton and Strathaven, and Caledonian Railway Companies.
15 Feb. North British Railway (Abbey Holme, and Leegat Branch).
15 Feb. North British Railway (Carlisle Citadel Station Branch).
Portpatrick Railway.
Portpatrick Railway (Steamboats).

Group 19.

15 Feb. Caledonian Railway (Glasgow Harbour Branches).
15 Feb. Clyde Navigation.
15 Feb. Edinburgh and Glasgow Railway.
15 Feb. Edinburgh and Glasgow, and Alva Railway Companies.
Forth Bridge Railway.
Glasgow and North British Railway.
Glasgow and Paisley Joint Line of Railway.
Glasgow (City) Union Railway.
15 Feb. Glasgow (City) Union Harbour Tramways.
15 Feb. Monkland Railways.

Group 20.

16 Feb. Dublin and Belfast Junction Railway.
15 Feb. Dublin and Meath Railway.
16 Feb. London and North Western Railway (Traffic Arrangements).
16 Feb. Londonderry and Lough Swilly Railway.
15 Feb. Newry and Greenore Railway.
Dublin and Baltinglass Junction Railway.
15 Feb. Dublin, Wicklow, and Wexford Railway.

Group 21.

Dublin Railway.
16 Feb. Dublin Grand Junction Railway.
16 Feb. Dublin Metropolitan Railway.
Dublin, Rathmines, Rathgar, &c., Railways.
16 Feb. Dublin Trunk Connecting Railway.
Great Southern and Western, and Midland Great Western Junction Railway.

FIRST REPORT

FROM THE

GENERAL COMMITTEE

ON

RAILWAY AND CANAL BILLS.

Ordered, by The House of Commons, *to be Printed,*
16 *February* 1864.

SECOND REPORT

FROM THE

GENERAL COMMITTEE

ON

RAILWAY AND CANAL BILLS.

The General Committee on Railway and Canal Bills have made the following alterations in the Groups already formed, and have agreed to report the same to The House:—

The Tooting, Merton, and Wimbledon Extension Railway Bill is taken out of Group 2, and added to Group 1.

The Blyth and Tyne Railway (Additional Powers),
The Blyth and Tyne Railway (New Works),
The North Durham Railways,
The Scarborough, Whitby, and Staithes Railway, and
The Blyth Dock Bills,
are taken out of Group 11, and added to Group 9.

The North Eastern Railway (Additional Powers), and
The North Eastern Railway (York and Doncaster Branch) Bills,
are taken out of Group 11, and added to Group 10.

SECOND REPORT

FROM THE

GENERAL COMMITTEE

ON

RAILWAY AND CANAL BILLS.

Ordered, by The House of Commons, *to be Printed,*
3 *March* 1864.

55—I.

THIRD REPORT

FROM THE

GENERAL COMMITTEE

ON

RAILWAY AND CANAL BILLS.

The General Committee on Railway and Canal Bills have made the following alterations in the Groups already formed, and have agreed to report the same to The House:—

The Great Eastern Railway (Junctions) Bill
is taken out of Group 8, and added to Group 1.

The London, Brighton, and South Coast Railway (Steamboats) Bill,
The Mayfield Railway Bill,
The Pulborough, Storrington, and Steyning Railways Bill,
and,
The West Sussex Junction Railway Bill,
are taken out of Group 4, and added to Group 3.

The Hereford, Hay, and Brecon Railway Bill
is taken out of Group 17, and added to Group 12.

THIRD REPORT

FROM THE

GENERAL COMMITTEE

ON

RAILWAY AND CANAL BILLS.

Ordered, by The House of Commons, *to be Printed,*
10 *March* 1864.

55—II.

FOURTH REPORT

FROM THE

GENERAL COMMITTEE

ON

RAILWAY AND CANAL BILLS.

The General Committee on Railway and Canal Bills have made the following alterations in the Groups already formed, and have agreed to report the same to The House:—

Group 7 is added to Group 6.

The Metropolitan District Railways (No. 2) Bill,
and,
The Metropolitan Grand Union Railway (No. 2) Bill,
are added to Group 1.

The Oswestry, Ellesmere, and Whitchurch Railway (No. 2) Bill is added to Group 14.

Group 21 is added to Group 20.

FOURTH REPORT

FROM THE

GENERAL COMMITTEE

ON

RAILWAY AND CANAL BILLS.

Ordered, by The House of Commons, *to be Printed,*
11 *April* 1864.

55—III.

FIFTH REPORT

FROM THE

GENERAL COMMITTEE

ON

RAILWAY AND CANAL BILLS.

The General Committee on Railway and Canal Bills have made the following alterations in the Groups already formed, and have agreed to report the same to The House:—

The London and South Western Railway (Additional Works) Bill, is taken out of Group 5, and added to Group 1.

FIFTH REPORT

FROM THE

GENERAL COMMITTEE

ON

RAILWAY AND CANAL BILLS.

Ordered, by The House of Commons, *to be Printed,*
18 *April* 1864.

SIXTH REPORT

FROM THE

GENERAL COMMITTEE

ON

RAILWAY AND CANAL BILLS.

The General Committee on Railway and Canal Bills have made the following alterations in the Groups already formed, and have agreed to report the same to The House:—

The Tottenham and Hampstead Junction Railway Bill is added to Group 1.

The following Bills are taken out of Group 1, and put into a new Group, 1 A.

GROUP 1 A.

Metropolitan Railway (Notting Hill and Brompton Extension).
Metropolitan and St. John's Wood Railway.
Charing Cross Railway.
Great Northern and Victoria Station Railway.
Great Eastern Railway (Junctions).

SIXTH REPORT

FROM THE

GENERAL COMMITTEE

ON

RAILWAY AND CANAL BILLS.

Ordered, by The House of Commons, *to be Printed,*
29 *April* 1864.

SEVENTH REPORT

FROM THE

GENERAL COMMITTEE

ON

RAILWAY AND CANAL BILLS.

The General Committee on Railway and Canal Bills have made the following alterations in the Groups already formed, and have agreed to report the same to The House:—

The Great Eastern Railway (Junctions) Bill is taken out of Group 1 A., and replaced in Group 1.

SEVENTH REPORT

FROM THE

GENERAL COMMITTEE

ON

RAILWAY AND CANAL BILLS.

Ordered, by The House of Commons, *to be Printed,*
9 *May* 1864.

55—VI.

EIGHTH REPORT

FROM THE

GENERAL COMMITTEE

ON

RAILWAY AND CANAL BILLS.

THE GENERAL COMMITTEE on RAILWAY and CANAL BILLS have formed the following Bills into a Group, and have agreed to report the same to The House:—

GROUP 22.

Great Northern and Western (of Ireland) Railway (No. 2) [*Lords*].
Carnarvon and Llanberis Railway (No. 2) [*Lords*].
Newry and Armagh Railway [*Lords*].
Great Northern and Western (of Ireland) Railway (No. 1) [*Lords*].
Redruth and Falmouth Junction Railway [*Lords*].

RAILWAY AND CANAL BILLS.

EIGHTH REPORT

FROM THE

GENERAL COMMITTEE

ON

RAILWAY AND CANAL BILLS.

Ordered, by The House of Commons, *to be Printed,*
17 *June* 1864.

55—VII.

NINTH REPORT

FROM THE

GENERAL COMMITTEE

ON

RAILWAY AND CANAL BILLS.

The General Committee on Railway and Canal Bills have made the following alteration in Group 22, and have agreed to report the same to The House:—

The Bembridge Railway, Tramway, and Pier Bill [*Lords*], is added to Group 22.

NINTH REPORT

FROM THE

GENERAL COMMITTEE

ON

RAILWAY AND CANAL BILLS.

Ordered, by The House of Commons, *to be Printed,*
7 *July* 1864.

55—VIII.

Brought from the Lords, 21 *July* 1864.

REPORT

FROM THE

SELECT COMMITTEE OF THE HOUSE OF LORDS

ON

RAILWAY COMPANIES' BORROWING POWERS;

TOGETHER WITH THE

PROCEEDINGS OF THE COMMITTEE,

MINUTES OF EVIDENCE,

AND APPENDIX.

Ordered, by The House of Commons, *to be Printed*,
22 *July* 1864.

REPORT - - - - - - - - - - - p. iii
PROCEEDINGS OF THE COMMITTEE - - - - p. vi
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REPORT.

BY THE SELECT COMMITTEE appointed to continue the Inquiry commenced last Session, and report as to what Legislative Measures are desirable for the purpose of restraining Directors of RAILWAY COMPANIES from exceeding the Limits fixed by their Acts of Parliament, and from evading those Provisions of their Acts of Parliament which require that a certain Portion of their authorized Capital shall be subscribed and paid up before their BORROWING POWERS can come into operation, and also to inquire and report what Securities can be given to the Holders of Debentures as to the Validity and Legality of the Issue of such Bonds;—And to Report to the House:—

ORDERED TO REPORT,

1. THE Committee having examined witnesses, and considered the subject referred to them, are of opinion that a compulsory public registration of railway debentures and debenture stock will afford means whereby the directors of railway companies may be restrained from exceeding the amount of their statutory borrowing powers.

2. It is the custom of Parliament, when granting to railway companies the powers necessary for carrying out their undertakings, to limit the amount of money they should be permitted to borrow, and to prescribe the conditions under which such borrowing powers should be exercised; and it is evidently the intention of the Legislature that no bonds, or other negotiable securities, other than those created under such limited and conditional powers, should be issued by the directors of railway companies.

3. This intention is, however, easily and commonly defeated by the issue of obligations (purporting to be for work done, or materials supplied for the purposes of the undertaking), commonly called Lloyd's bonds. The holders of these obligations can sue upon them, and recover judgment against the companies; and success in any conflict for priority of claim between them and the holders of statutory debentures, would appear, from evidence given before the Committee, to be only a question of more or less diligence.

4. The directors of some railway companies are in the habit of issuing securities of this description without consulting their shareholders, and without the knowledge or consent of the statutory debenture holders; and the gross amount of them, which may be outstanding against a company, is unlimited.

5. The Committee are of opinion that holders of statutory debentures, duly registered as above recommended, should have a right to recover and secure the payment of all principal and interest due to them, by the appointment of a receiver in priority to the holders of Lloyd's bonds, or of any other obligations or acknowledgment of indebtedness not issued under the authority of Parliament.

6. Such an arrangement may, however, be defeated, or at all events materially interfered with, if a creditor is allowed to seize the stock of the company, and thereby stop the traffic on the line, and the income derived therefrom. The property is of a different character to other property. The public have a

right to the use of the railway, and would be seriously inconvenienced by the stoppage of even a short line. It appears, therefore, to the Committee, that this power ought not to be allowed to the creditors of railway companies.

7. The Committee see no reason why railway companies should continue altogether free from the adjusting process to which other trading companies are liable through proceedings in bankruptcy. On the contrary, they are of opinion that the present practice by which the affairs of companies practically bankrupt are patched up by successive Acts of Parliament is injurious to the public, and too frequently of no real benefit to the shareholders. When a company pays little or no dividend on its original capital, the working expenses are often cut down injuriously, danger arises from insufficient service, and the risk of present loss attending any reduction of fares, even with the fairest expectation of future profit, is a bar to liberality of management. For the public advantage, it is desirable that a railway should yield reasonable returns to those under whose control it is placed; and when a company becomes seriously embarrassed, it is expedient that the concern should be transferred to others, under whose management it may be efficiently conducted. The knowledge that such must be the result of mismanagement would probably have a most beneficial effect on the proceedings of directors, and subject the credit which they would be able to obtain to some useful restraint. With the present facilities for forming companies, there would be no difficulty in finding purchasers under sound and just regulations to be provided in a Public Act, whereby Parliament would be relieved from having to deal with a class of Private Bills which are very troublesome to settle, and are never of a satisfactory character. The rights of the holders of statutory securities, including the regular payment of their dividends, should of course be carefully secured throughout all the proceedings.

8. As an example of the extent to which some railway directors are disposed to infringe the restrictions and conditions of their Acts of Parliament, the Committee would call the attention of the House to the evidence given before a Committee of the House of Commons during this Session in the case of the Tewkesbury and Malvern Railway Bill. The evidence will be found in the Appendix.

15 July 1864.

ORDER OF REFERENCE.

Die Veneris, 27° *Maii*, 1864.

RAILWAY COMPANIES' BORROWING POWERS.

Moved, "That a Select Committee be appointed to continue the inquiry commenced last "Session, and report as to what legislative measures are desirable for the purpose of restraining Directors of Railway Companies from exceeding the limits fixed by their Acts of "Parliament, and from evading those provisions of their Acts of Parliament which require "that a certain portion of their authorised Capital shall be subscribed and paid up before "their Borrowing Powers can come into operation; and also to inquire and report what "securities can be given to the holders of debentures as to the validity and legality of the "issue of such bonds;" agreed to—(the Viscount *Hutchinson*).

The Lords following were named of the Committee; the Committee to meet on Tuesday next, at Four o'clock, and to appoint their own Chairman:

Lord President.	Lord Wodehouse.
Duke of Devonshire.	Lord Redesdale.
Lord Steward.	Lord Stanley of Alderley.
Earl of Airlie.	Lord Dartrey.
Earl of Macclesfield.	Lord Overstone.
Earl of Belmore.	Lord Chelmsford.
Earl of Powis.	Lord Taunton.
Viscount Hutchinson.	

Die Lunæ, 13° *Junii*, 1864.

"The Evidence taken from time to time before the Select Committee to be printed for the "use of the Members of this House; but no copies thereof to be delivered, except to the "Members of the Committee, until further order."

LORDS PRESENT, AND MINUTES OF PROCEEDINGS AT EACH SITTING OF THE COMMITTEE.

Die Martis, 31° *Maii*, 1864.

LORDS PRESENT:

Lord Steward.	Lord Wodehouse.
Earl of Airlie.	Lord Redesdale.
Earl of Belmore.	Lord Dartrey.
Earl of Powis.	Lord Overstone.
Viscount Hutchinson.	Lord Taunton.

Order of Reference read.

Order of the House of Friday last, empowering the Committee to appoint their own Chairman, read.

It is proposed that the Viscount *Hutchinson* do take the Chair.

The same is agreed to, and the Viscount *Hutchinson* takes the Chair accordingly.

The course of Proceeding is considered.

Ordered, That the Committee be adjourned till Friday, the 10th of June, One o'clock.

Die Veneris, 10° *Junii*, 1864.

LORDS PRESENT:

Lord Steward.	Lord Redesdale.
Earl of Airlie.	Lord Stanley of Alderley.
Earl of Belmore.	Lord Dartrey.
Earl of Powis.	

In the absence of the Viscount *Hutchinson*, the Earl of *Belmore* takes the Chair.

Order of adjournment read.

The Proceedings of the Committee of Friday, the 31st of May last, are read.

The following Witnesses are called in, and examined; viz., *James Hope*, Esq., and *James Greig*, Esq. (*Vide* the Evidence.)

Ordered, That the Committee be adjourned till Thursday next, One o'clock.

Die Jovis, 16° *Junii*, 1864.

LORDS PRESENT:

Duke of Devonshire.	Earl of Powis.
Lord Steward.	Lord Redesdale.
Earl of Airlie.	Lord Dartrey.
Earl of Belmore.	Lord Overstone.

The Earl of Belmore in the Chair.

Order of adjournment read.

Order of the House of Monday last, That the Evidence taken from time to time before the Select Committee be printed for the use of the Members of this House, but that no copies thereof be delivered except to the Members of the Committee until further order, read.

The Proceedings of the Committee of Friday last are read.

The following Witnesses are called in, and examined; viz., *J. Horatio Lloyd*, Esq., and Honourable *W. Napier*. (*Vide* the Evidence.)

Ordered, That the Committee be adjourned till Thursday the 30th of June, Two o'clock.

Die Jovis, 30° *Junii*, 1864.

LORDS PRESENT:

Lord President.	Earl of Powis.
Duke of Devonshire.	Viscount Hutchinson.
Lord Steward.	Lord Redesdale.
Earl of Airlie.	Lord Dartrey.
Earl of Belmore.	Lord Overstone.

The VISCOUNT HUTCHINSON in the Chair.

Order of adjournment read.

The Proceedings of the Committee of Thursday the 16th of June last are read.

A Draft of a Report is laid before the Committee by the Chairman.

The same is read, and several Amendments are made therein.

The following paragraph of the Draft Report (2) is then read, and is as follows:

"It is the custom of Parliament, when granting to railway companies the powers necessary for carrying out their undertakings, to limit the amount of money they should be permitted to borrow, and to prescribe the conditions under which such borrowing powers should be exercised; and it is evidently the intention of the Legislature that no bonds, or other negociable securities other than those created under such limited and conditional powers, should be issued by the directors of railway companies."

Objected to.

On question, That the paragraph proposed stand part of the Report:

Contents.	Not Contents.
Duke of Devonshire.	Lord President.
Lord Steward.	Earl of Airlie.
Earl of Belmore.	
Earl of Powis.	
Viscount Hutchinson.	
Lord Redesdale.	
Lord Dartrey.	
Lord Overstone.	

The following paragraph is then proposed by the Lord *Redesdale:*

"The Committee are of opinion that holders of statutory debentures, duly registered as above recommended, should have a right to recover and secure the payment of all principal and interest due to them, by the appointment of a receiver in priority to the holders of Lloyd's bonds, or of any other obligations or acknowledgment of indebtedness not issued under the authority of Parliament."

Objected to.

On question, That the paragraph proposed stand part of the Report:

Contents.	Not Contents.
Duke of Devonshire.	Lord President.
Lord Steward.	Earl of Airlie.
Earl of Belmore.	
Earl of Powis.	
Viscount Hutchinson.	
Lord Redesdale.	
Lord Dartrey.	
Lord Overstone.	

The following paragraph is then proposed by the Lord *Redesdale:*

"Such an arrangement may, however, be defeated, or at all events materially interfered with, if a creditor is allowed to seize the stock of the Company, and thereby stop the traffic on the line and the income derived therefrom. The property is of a different character to other property. The public have a right to the use of the railway, and would be seriously inconvenienced by the stoppage of even a short line. It appears, therefore, to the Committee that this power ought not to be allowed to the creditors of railway companies."

Objected to.

On question, That the paragraph proposed stand part of the Report:

Contents.	Not Contents.
Duke of Devonshire.	Lord President.
Lord Steward.	Earl of Airlie.
Earl of Belmore.	Earl of Powis.
Viscount Hutchinson.	
Lord Redesdale.	
Lord Dartrey.	
Lord Overstone.	

The following paragraph is then proposed by the Lord *Redesdale:*

"The Committee see no reason why railway companies should continue altogether free "from the adjusting process to which other trading companies are liable, through pro- "ceedings in Bankruptcy. On the contrary, they are of opinion that the present practice "by which the affairs of companies practically bankrupt are patched up by successive Acts "of Parliament is injurious to the public, and too frequently of no real benefit to the "shareholders. When a company pays little or no dividend on its original capital, the "working expenses are often cut down injuriously, danger arises from insufficient service, "and the risk of present loss attending any reduction of fares, even with the fairest expec- "tation of future profit, is a bar to liberality of management. For the public advantage, "it is desirable that a railway should yield reasonable returns to those under whose control "it is placed; and when a company becomes seriously embarrassed, it is expedient that "the concern should be transferred to others under whose management it may be efficiently "conducted. The knowledge that such must be the result of mismanagement would pro- "bably have a most beneficial effect on the proceedings of directors, and subject the credit "which they would be able to obtain to some useful restraint. With the present facilities "for forming companies, there would be no difficulty in finding purchasers under sound "and just regulations to be provided in a Public Act, whereby Parliament would be "relieved from having to deal with a class of Private Bills which are very troublesome to "settle, and are never of a satisfactory character. The rights of the holders of statutory "securities, including the regular payment of their dividends, should of course be carefully "secured throughout all the proceedings."

Objected to.

On question, That the paragraph proposed stand part of the Report:

Contents.	Not Contents.
Duke of Devonshire.	Lord President.
Earl of Belmore.	Earl of Airlie.
Viscount Hutchinson.	Earl of Powis.
Lord Redesdale.	Lord Dartrey.
Lord Overstone.	

Ordered, That the Committee be adjourned till Wednesday next, Four o'clock.

Die Martis, 5° die Julii, 1864.

LORDS PRESENT:

Lord Steward.	Viscount Hutchinson.
Earl of Airlie.	Lord Overstone.
Earl of Belmore.	

The VISCOUNT HUTCHINSON in the Chair.

Order of adjournment read.

The Proceedings of the Committee of Thursday last are read.

The Draft Report is again read, several further Amendments are made therein, and the same, as amended, is agreed to. (*Vide* the Report).

Ordered, That the Lord in the Chair do make the said Report to the House.

MINUTES OF EVIDENCE.

LIST OF WITNESSES.

Die Veneris, 10° *Junii*, 1864.

James Hope, Esq. - - - - - - - - - - p. 3

Mr. James Greig - - - - - - - - - - p. 10

Die Jovis, 16° *Junii*, 1864.

John Horatio Lloyd, Esq. - - - - - - - - - p. 17

Hon. William Napier - - - - - - - - - p. 32

Die Veneris, 10° *Junii* 1864.

LORDS PRESENT:

Lord Steward.	Lord Redesdale.
Earl of Airlie.	Lord Stanley of Alderley.
Earl of Powis.	Lord Dartrey.
Earl of Belmore.	

Earl of BELMORE in the Chair.

JAMES HOPE, Esquire, is called in, and examined as follows:

1. *Chairman.*] I believe you are Deputy Keeper of the Signet of Scotland? Yes.

2. Have you turned your attention to the subject of registration in connexion with the debentures of joint stock companies?

Yes; I did so last autumn at the request of two of the judges who were connected with me in the department of Jurisprudence at the Social Science meeting which took place at Edinburgh, and they requested me to draw up a paper upon the subject. Considering the amount which is invested in debentures, and that kind of securities, they thought it was very important that the public should have the security of a public register. Of course, at present, the public do not know whether the companies have exceeded their powers or not. They never go to the offices of the companies to search through their books.

3. Will you state from your paper the suggestions which you have to make in connexion with this subject?

I propose, first, that public registers should be kept in London, Edinburgh and Dublin, for all companies having their principal offices or places of business in England, Scotland and Ireland respectively; secondly, that all existing joint stock companies having debenture debts or stock should be required to give in to the respective registrars a return duly certified as at a certain date, specifying the Acts of Parliament under which they are authorised to borrow money, the amount so authorised, the amount which the shareholders have authorised to be borrowed by resolutions of general meetings, and the dates of such meetings, and the amount of debenture bonds and debenture stock which has been issued and is then due and outstanding by each company; and that all existing and future companies should be required to make returns, from time to time, of all Acts hereafter passed authorising the borrowing of money, or effecting any changes in their power of borrowing, the amount authorised to be borrowed, the amount sanctioned at general meetings of the shareholders, and the dates of such meetings. I have prepared forms which show very simply what I propose. This is the form in which the Register of Returns of borrowing power might be kept.

The Witness delivers in the same, which is as follows:

James Hope, Esq.

10th June 1864.

Name of Company .

No. I.—RETURNS of Borrowing Power.

Date when Received.	ACTS of PARLIAMENT.	Amount authorised by Acts.	Amount sanctioned by Share-holders.	Date of Meeting when sanctioned.	Amount of Debenture Bonds and Debenture Stock outstanding at Date of Return	
					Bonds.	Stock.
1863:		£.	£.		£.	£.
Sep. 28 -	21 & 22 Vict. c. 65 - - - - -	200,000	200,000	1863: Jan. 10	150,000	50,000
	23 Vict. c. 61 - - - - -	100,000	50,000	,, Feb. 12	50,000	—
	24 Vict. c. 40 - - - - -	300,000	300,000	,, July 12	300,000	—
	£.	600,000	550,000	- -	500,000	50,000

1864: Jan. 31. Sanctioned - £. 550,000

In Circulation:
(*See* Form No. II.)

Debentures - -	£. 496,000	
Debenture Stock -	49,000	
		545,000
Within Limit - - -	£.	5,000

4. To whom is this return of the borrowing powers to be made?

It is to be made by the company to the keeper of the register which shall be established. Of course each company must be obliged to certify to its correctness, and be responsible for it. I proceed upon the assumption of that return being made correctly.

5. Lord *Redesdale.*] By whom do you think the registrar should be appointed?

In Scotland the register might be kept in the Register House under the Lord Clerk Registrar. There is a registrar of joint stock companies in Scotland, as there is elsewhere under "The Companies Act, 1862." I think the registrar's department might easily do it; it would be a very simple thing.

6. Do you know whether there is a similar official holding an appointment in London and Dublin?

Under the Joint Stock Companies Act, there is a registrar in London. The date of the Act is 1862.

7. *Chairman.*] Is he a public officer?

Yes.

8. Lord *Redesdale.*] Do you suppose that that office would be capable of undertaking the additional duties of registration?

Not without some additional staff.

9. How do you propose that the funds necessary for meeting the expenses of this registration should be provided?

That does not exactly come within my business. I take for granted the Treasury must provide the funds. If it is advisable to establish a register, it must be done at the public expense.

10. You do not think that the companies, in return for the advantages which they would get by reason of their securities being registered, should provide the funds themselves?

In my paper, I suggest that a fee should be charged. Perhaps the fairest way would be to let all the companies be assessed proportionately every year, according to the value of their undertakings as made up by the public assessor of railways; they are all charged proportionately the expenses of his office every year, according to their interest.

11. Earl of *Powis.*] That only applies to Scotland, because there is no such office in England?

I believe there is not.

12. Earl

James Hope, Esq.

10th June 1864.

12. Earl of *Airlie.*] You propose to register only the amount of debenture debt which each company is authorised to incur by its Act?

Only the debenture bonds and stock.

13. You are aware that the companies have other liabilities besides the debenture bonds?

Yes. I did not take that into consideration, as such other liabilities are not created by an exercise of borrowing power. The third suggestion which I have to make is, that each return be registered in a separate book or part of a book for each company. That it should be incumbent on all companies, after the foresaid certain date, to transmit to the respective registrars, for registration before they are issued, all debentures and certificates of debenture stock. The registrar to register these shortly by an entry of the number, date, and amount, with the addition of a registration number and date, and to certify on each the fact and date of registration. A registration fee to be paid for the registration of each debenture or certificate. This is the second of the forms of Register which I should propose:

The Witness delivers in the same, which is as follows:

Name of Company .

No. II.—REGISTER of Issue of Bonds or Debentures, and of Certificates of Debenture Stock.

Register Number.	Date.	DEBENTURE BONDS. Number.	Date.	Amount.	DEBENTURE STOCK. Number of Certificate.	Date.	Amount.
	1863: Sept. 28	Amount issued, per Return	1863: - -	£. 500,000	Amount issued, per Return -	1863: - -	£. 50,000
1	Dec. 2	451	Dec. 1	1,000			
2	,, 2	452	,, 1	500			
3	,, 3	- - - - - -	,, 1	- -	27	Dec. 1	500
4	,, 3	453	,, 2	1,000			
5	,, 3	454	,, 2	500			
6	,, 3	- - - - - -	,, 2	- -	28	,, 3	1,000
		Amount, 31 January 1864 -	-	503,000	- - -	- -	51,500
		Deduct Discharges (*see* Form No. III. - -	- -	7,000	- - -	- -	2,500
		Outstanding, 31 Jan. 1864 - - - £.		496,000	- - -	- -	49,000

Then I would propose, that it be incumbent also on the companies to send in for registration all debentures or other vouchers of debenture loans or stock which are discharged. These will be registered under a separate heading in the book or part of the book applicable to each company. This is the third of the forms of Register I propose, and it is applicable to discharges of debentures.

The Witness delivers in the same, which is as follows:

Name of Company .

No. III.—REGISTER of Discharges of Debentures and Debenture Stock.

Date when Lodged.	DEBENTURES. Number of Debentures.	Date.	Registration Number.	Amount.	DEBENTURE STOCK. Number of Certificate.	Date.	Registration Number.	Amount.
				£.				£.
1864: Jan. 1	380	1858: Nov. 1	- -	1,000				
,, 2	382	1859: May 11	- -	4,000				
,, 4	- -	- -	1	1,000				
,, 6	384	1860: May 11	- -	500				
,, 9	- -	- -	- -	- -	1	1858: May 15	- -	2,000
,, 10	- -	- -	2	500	3	- -	- -	500
	Amount, 31 Jan. 1864 - - - £.			7,000	- -	- -	- -	2,500

James Hope, Esq.

10th June 1864.

14. *Chairman.*] The debentures which you propose to register are those which shall be hereafter issued?

The existing ones would come in, in course of time, to be discharged. It has been pressed upon me by several gentlemen that it would be desirable that the companies should give in a list of all the existing debentures. I do not myself see the good of that. It would be no greater security to the public than if the company gave in the total amount which they have issued. The Company might return every individual debenture, but I think it would be rather cumbersome.

15. Are you of opinion that this scheme of registration would be any security to the public, without there was also a scheme for an endorsement on each debenture, showing the amount that the company were empowered to borrow, or the extent to which their borrowing powers had been exercised?

Yes; under the Form No. I. they would see the amount authorised to be borrowed, and the amount sanctioned by the shareholders to be borrowed; under Forms II. and III. they would see the amount issued and amount discharged in that way, it is seen at once how much is in circulation.

16. That supposes that every person who receives a debenture takes the advantage of the registration?

Yes: at present, when the public get debentures, they never think of searching the companies' books; it would be needless, and it is never done; people trust to its all being correct.

17. Earl of *Airlie.*] Is it not the practice of persons lending money upon heritable security to search the register first?

It is. My proposal is to put debentures of public companies on the same footing as landed securities.

18. You think there would be no more difficulty in the case of railway stock?

None whatever.

19. You think it would be just as easy to search the register in that case as it is in the case of money being lent upon land?

Just as easy.

20. Lord *Redesdale.*] Unless there is some record of debentures being registered, how is it any protection against companies issuing debentures beyond the amount which they are entitled to?

It is provided here that they should be marked by the registrar, and a certificate put upon them of being registered, and the date given.

21. That is, as to new debentures being issued in lieu of those which are at present out?

Yes.

22. Earl of *Airlie.*] With regard to the debentures which are out at present, you must wait for them to come in before you can enforce a registration of them?

Yes. Some gentlemen have been pressing that upon me that it would be necessary to provide for the registration of existing debentures, but I do not think it is absolutely necessary; we must take it for granted that the first return shows the total amount of existing debentures accurately.

23. How do you propose to enforce this registration? Do you propose that a penalty should be imposed upon companies issuing debentures which are not registered, or would you make debenture bonds not valid which are issued without being registered, or would you give priority to the registered bonds over the unregistered bonds?

All the future debentures are to be sent in to be registered and marked.

24. What penalty do you propose to inflict upon companies in case of that not being done?

That is a matter of detail which must be settled in the Act of Parliament. I did not prepare an Act. I may mention here the further suggestions I have to make as to the mode of keeping the register. I was explaining when I gave in the form of Register No. III., that discharged debentures would be entered as shown in that form. The entry will consist, if it applies to debentures or other vouchers issued prior to the establishment of the register of the date of lodging

lodging the discharge, the number, date, and amount of the documents discharged; and, if it is a registered document, the registered number and amount. A certificate of registration will be put on the discharged debenture or other voucher, and a fee will be payable by the company for each registration. Then, in regard to the three forms or divisions of the register, I proposed that it shall be the duty of the registrar to sum up the columns of the register as soon as each page is completed, and to strike a yearly balance of the amount of debentures and debenture stock appearing from the register to be in circulation. That it shall also be his duty to decline to register debentures or certificates of debenture stock issued by any company which shall be in excess of the issuing power of such company, as appearing from the register. That each company shall make a return yearly to the registrar of the amount of debentures or debenture stock owing or outstanding by each company at a certain date. The registrar to compare the same with his register, and, if it differs in amount from what appears from the register to be owing and outstanding, the registrar shall apprise the secretary of the company of such difference, who shall be obliged to rectify or explain any error or discrepancy in the return to the satisfaction of the registrar. It is not proposed that any transfers of debentures shall be registered, nor memorandums or agreements of renewal of any debenture where the original debenture is continued as the security; the object of registration being to show the amount in circulation, which is not affected by transfers, or by a mere postponement of payment. That the registers shall be open for the inspection of the public on payment of a fee for each inspection, and the registrar shall keep an index by which each company's account in the register may be at once turned up.

25. Lord *Dartrey.*] Then you do not propose by your scheme to control the companies in any way from incurring debt in any other manner than by issuing debenture bonds; for instance, if they were to give bonds to contractors in payment for work done, those bonds might be put into circulation to any amount; your scheme would not put any check upon that?

I think that is matter for the Act of Parliament.

26. Earl of *Powis.*] Would debenture debts take priority of simple contract debts, or such debts as Lloyd's bonds?

As I understand, the Railway Acts debentures over-ride everything.

27. Earl of *Airlie.*] Have they not a way of evading that?

I do not think they can, but if a railway company were to come to an actual smash, the bondholders would have a preference over other creditors.

28. *Chairman.*] Would you propose that no debenture which was not registered should be a valid debenture, and constitute a valid debt against a company; for instance, supposing a Board of Directors intended to act fraudulently, and they were dealing with persons who were inexperienced and not well informed as to the system of registration, and they issued debentures to them which were informal; in point of fact, for want of being registered, would you propose, in that case, that the persons who took those debentures should lose their money if the money were lost?

I think that the company should lose it at all events.

29. You would make it valid against the company?

The company should certainly be liable.

30. Earl of *Powis.*] Would not the position of a person who holds bonds which had not been properly registered, be, as regards any remedy against the company, the same as the position of any persons who had shares issued to them fraudulently, or in excess of the company's powers?

I think it would.

31. Do you think that any special enactments would be required to protect them?

I think it would be as well if there were something more than what is contained in the existing Acts.

32. Earl of *Airlie.*] In the case of money lent upon heritable security, which is an analogous case, is it not the case that the registered debts have priority over the debts that are not registered?

Yes; they all take precedence according to the date of registration; if you want

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want to buy an estate, the first thing your solicitor does is to search the register to see what burthens there are upon it.

33. Then you would give railway companies' bonds which are registered a priority over those which are not registered?
Certainly.

34. *Chairman.*] I understood you to say that you would make valid against the company any unregistered bonds?
I think so; but that registered bonds should have a preference.

35. Lord *Redesdale.*] Why should they be valid against the company if you enact that no bonds shall be valid unless registered; it is then the fault of the person who takes them, is it not?
Yes, certainly.

36. Earl of *Airlie.*] Supposing a case in which a company was obliged to wind up its affairs, and the stock of the company was not sufficient to meet the registered debentures, and there were other debentures not registered, would you then give a priority to the registered debentures over the unregistered debentures?
Certainly; just in the same manner as heritable bonds on an estate; if they are not registered they are not worth anything against the estate.

37. Persons who wished to lend money, in cases where unregistered debentures would not be valid, would be just as careful to have them registered, as people are now who lend money on landed property?
Certainly; it might be specified that they should be registered within a certain time.

38. Earl of *Powis.*] Would it not be desirable that the register should contain an entry of the term for which such debentures were issued?
Yes; that could be very easily added in another column.

39. Do you think that would be desirable?
I think it would make the matter more distinct.

40. You do not propose to enter the name of the bondholder in this account, but merely the nature of the bond?
The nature of the bond, and the total amount. It should be made as short and as simple as possible. The names of the parties are not absolutely necessary, because the names of the parties are no additional security to the public.

41. Therefore it would be an unnecessary intrusion into the private affairs of the lenders?
Yes. There are some professional gentlemen who are very anxious that that should be done; but I think it would be cumbrous and hard on the companies to compel them to give such an immensely long return as that would necessitate. I think there should be a slight addition made to No. II. There is an Act of Parliament which provides that if any railway company purchases land, and does not pay the money, but pays an annual sum, which is sometimes done, then that that sum shall be converted into twenty years' purchase, and deducted from the amount that they are empowered to borrow. That could be easily provided for at the end of No. II, by adding the words "and any diminution of the power of borrowing in consequence of the company acquiring land in consideration of an annual payment."

42. Is that so in all cases in which companies suffer in that way, that the amount is capitalized?
Yes.

43. That is in all cases deducted from the borrowing powers?
Yes. The statute is the 22 & 23 Vict. c. 106.

44. Of course you require them to show that on the face of the returns, as well as the amount of the debentures?
Yes; I think those words should be added at the end of No. II.

45. Lord *Redesdale.*] The provision which you propose with regard to the diminution of borrowing powers on account of rents paid, is precisely the same thing

thing as is required with regard to the issue of debenture stock, which also reduces the power of issuing debentures on mortgages. With regard to mortgages all the borrowing powers of the company must be set forth, in the first instance, and what is out upon other securities of different kinds than those of the debentures which are alone to be registered?

I did not propose to register any transfers of debentures, nor memorandums of agreements for renewing them, because there is no additional debt contracted. The debt is already out. But some gentlemen think that that should be done. With that view, I have prepared another Table. I do not think myself it is necessary.

The Witness delivers in the same, which is as follows:

Name of Company

No. IV.—SUBSIDIARY REGISTER of Transfers, Renewals and Discharges of Debentures and Debenture Stock comprised in the Return made by the Company as due and outstanding at (*date*).

DEBENTURES. Amount outstanding per Return at (*date*) - £. 500,000.					DEBENTURE STOCK. Amount outstanding per Return at (*date*) - £. 50,000.				
Date when lodged.	Number of Debentures.	Transfer, Discharge or Agreement of Renewal.	Registration Number.	Amount.	Date when lodged.	Number of Certificate.	Transfer or Discharge.	Registration Number.	Amount.
1864:				£.	1864:				£.
1 January -	560	Transfer -	1	1,000	2 January -	58	Transfer -	1	1,000
3 „ -	396	Renewal by Agreement.	2	2,000	5 „ -	60	„ -	2	2,000
5 „ -	491	Discharge -	3	3,000	7 „ -	40	Discharge -	3	1,000
			£.	6,000				£.	4,000

Note.—This being a mere subsidiary Register, it would come to an end when all the debentures and debenture stock outstanding at the establishment of the Register have in course of time come in for registration in consequence of transfers, agreements of renewal, or discharges. All discharges entered in this subsidiary Register would also be entered in the ordinary Register of discharges, Form, No. III.

46. Have you turned your attention to the question of Lloyd's bonds?
No, I have not. I do not know that we have any of those in Scotland.

47. Earl of *Airlie.*] Do you not know, as a matter of fact, that in Scotland many railway companies have outstanding liabilities besides their debenture debt?
Yes.

48. You have not made any provision, in your plan of registration, to meet that?
No.

49. You do not wish them to show the amount of their debentures?
That is what the public lend their money upon.

50. Supposing there are other outstanding liabilities, is their security as good?
I should not think so.

51. *Lord Steward.*] Have you made any calculation of the probable cost of carrying this plan into effect?
I have done so in a rough way, and I think it might cost about 1,000 *l.* a year in Scotland. I think a register might be established and kept up for that sum.

52. *Chairman.*] Is that supposing it to be in London, or in Scotland alone?
If it could be joined with the Registrar of Joint Stock Companies it could be done much cheaper, but I was supposing a separate registrar.

53. *Lord Steward.*] You think it might be done by one of the existing registrars; but if it was found necessary to establish a separate office you think it might probably cost 1,000 *l.* a year?
I think we should not calculate on less, but I am speaking of Scotland alone. The Lord Clerk Registrar told me there would be no difficulty in having such

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a register in some of the offices of the Register House in Edinburgh. Of course if that were possible it would lessen the expense very much?

54. *Chairman.*] Have you any other suggestions to offer?
No, I think not.

The Witness is directed to withdraw.

JAMES GREIG, Esq., is called in, and examined as follows:

James Greig, Esq.

55. *Chairman.*] I BELIEVE you have been for many years a Director of the Chamber of Commerce?
I have.

56. You are now the secretary?
I am.

57. Of how many persons is that Chamber of Commerce composed?
Nearly 500.

58. What professions do they follow?
They are bankers, merchants, money lenders, and persons engaged in business; they exclude lawyers.

59. Do they comprise any persons except those resident in Edinburgh?
Yes, we do not exclude any; but they are mostly from Edinburgh, Leith, or the county of Mid-Lothian.

60. Have they petitioned Parliament for some remedial measure with regard to the irregular or fraudulent issue of debentures?
Yes; they unanimously petitioned both Houses of Parliament, stating the absolute necessity, in their judgment, for a change in the law.

61. Were debentures formerly in great request as security for money?
They were, undoubtedly.

62. But they were not in request as security to such an extent as land?
Certainly not; land has always been held to be the best security possible; still I think they were as much in use, on account of being more easily managed than mortgages over land.

63. Which kind of security generally used to produce the highest rate of interest?
Debentures; the interest on land was usually low in Scotland.

64. What do you ascribe as the reason for the higher rate of interest that the debentures commanded?
On account of their being reckoned such excellent security; you could lend any sum on a debenture, whereas if you wanted land you must take the sum that the agent required.

65. Until lately was it not the case that, with occasional exceptions, the Act of 1845 was considered by the public as a sufficient security to protect lenders?
Undoubtedly. There was an idea abroad, even among men of business, that the recording of stock by the secretaries of companies was a sufficient security without examining into it; but when the disclosures took place in connexion with the West Hartlepool Railway Company, and discussions ensued upon that, debentures fell into considerable disrepute in Scotland.

66. Earl of *Powis.*] What is the current rate of interest on land at the present moment in Scotland?
Four and four-and-a-half per cent.

67. What rate of interest are the companies giving during the present year for their debentures?
It is of course various. The stocks of most of our railway companies in Scotland, until within the last year or two, were reckoned very inferior securities; but

but they have got much firmer in the market within the last few years; and in consequence, they are enabled to borrow money at a cheaper rate than they were before.

68. Do you know what rate of interest the Edinburgh and Glasgow, and Caledonian Companies are giving during the present year?
It is about 4 per cent. on debentures, and 4, 4½, and 5 on preference stock.

69. Earl of *Airlie.*] You state that 4½ per cent. is the current rate of interest on land at the present time?
We have an association that meets occasionally from time to time, who, looking at the rate of interest at which money is being invested everywhere, fix the rate of interest upon landed property, and that is the rate at which it usually goes. They may within three months alter the rate, so that it is continually varying in that way.

70. Have they fixed the rate at present at 4½ per cent?
I think it is 4½ per cent.

71. When did they fix that rate?
It was about six months ago.

72. Then payments made before that, were not at the rate of 4½ per cent?
I think not.

73. But they are now 4½ per cent?
They are now 4 and 4½ per cent.

74. Does interest upon land mortgages in Scotland, fluctuate from one half year to the other?
Very frequently it does. When money at the Bank is rising or falling very much, they meet more frequently; whereas, if there is a long, steady lull, they do not meet at all, or only twice a year.

75. Earl of *Powis.*] Does that change of interest apply to existing mortgages, or merely new ones?
It applies to existing mortgages as well as new ones.

76. *Chairman.*] Is it not the case that railway companies in Scotland have exceeded their powers of borrowing?
Personally, I cannot speak to that. I made it my duty to inquire of men whom I know to be of high character and great experience; and I was informed that companies have exceeded their powers in borrowing, and they run it so close occasionally, that sometimes they issue debentures beyond their powers, trusting to others falling in before the fresh ones, which they issue, become payable, and thereby bringing them down to the statutory amount.

77. Do you think it is the case that Boards of Directors in any instances have issued in a fraudulent sense debentures beyond their powers?
I should not like to use the word "fraudulent." I believe they have done it, but whether is was fraudulently done I cannot say; I doubt if fraud was intended.

78. In the event of a Company being compelled to wind up its affairs, are you of opinion that the debentures issued in excess of the Parliamentary powers of the Company should have validity, *pari passu*, with the debentures issued in the first instance, and which were within the limits of their Parliamentary powers?
I suspect at present they would; that, of course, is a question of law. I am quite assured of this (answering a question which is within my own competency), that if some Companies were to stop at a certain time they would be found to have more debentures in the market than they were authorised to issue by the statute.

79. All those debentures you think were equally valid?
My belief is they are equally valid; the supposition by the parties lending the money was that the Companies were borrowing within their powers, and in equity the debentures are equally valid.

80. Earl of *Airlie.*] You say you have petitioned Parliament for a change in the law; what remedy do you propose?

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We propose that instead of the register kept by the Companies, which is no security at all, there should be a public register kept in London, Edinburgh, and Dublin, of easy access. I may state that I have seen Mr. Hope's proposal; he sent a copy of it to the Chamber, and asked our opinion of it. I looked at it very carefully, and I may state that I concur substantially with Mr. Hope in the plan which he proposes.

81. Mr. Hope proposes to establish a register office, and to make it incumbent that the bonds of the Companies should be registered; but I do not think he proposes any means of enforcing that; how would you enforce it?
I would forbid the registrar to register any debentures that were beyond the sum which the Company was authorised to issue.

82. How would you enforce the registration; would you give a priority to registered bonds as against unregistered bonds?
I think so; in the first place I would make it imperative that all should be registered, and I have not the slightest doubt that the effect of that would be that no man would dream of lending sixpence upon a debenture which was not registered.

83. How would you make it imperative?
If Parliament required that they should all be registered, and if a public registrar were appointed with instructions that he was to register no debentures beyond the sum which the Company was authorised to issue, I should consider that there would be no occasion for raising the question of priority.

84. How would you meet the case of a Company, who, having issued the full amount of debentures which it was authorised to issue, and having registered that amount, were afterwards to issue further debentures without registering them?
The only way of meeting that case, if it be supposed possible, which I do not consider it to be, would be by imposing a penalty on the Company.

85. In the case of money lent upon heritable security, debts which are registered have a priority, have they not, over debts which are not registered?
Mortgages have a priority according to their dates.

86. Following the same analogy, would it not appear to be reasonable to take the same course with regard to Railway Companies?
Undoubtedly; with regard to mortgages upon heritable property, the first mortgage has the first claim.

87. Would not the fact that the registered bonds have priority, make people very careful to see that the bonds are registered?
I think it would go very far to do so. Bonds not registered would be refused.

88. *Chairman.*] Suppose a debenture holder was so careless as not to see that his bond was registered, and that the Board of Directors had illegally issued unregistered bonds, would you make those bonds valid against the general assets of the Company, or against the directors personally?
I think if they issued bonds contrary to their Act of Parliament, that they should be made personally liable, in the same way that bankers are if they have not a limited liability.

89. That is to say, the directors should be personally liable?
Yes.

90. Then you would not make these bonds valid against the Company at all?
I think that they should be valid against the Company to the extent that the Company can meet them; but they must meet the registered bonds first.

91. Supposing the directors, on their own responsibility, issued these debentures, would you make the directors personally liable alone, and exonerate the Company, or would you make the whole Company responsible?
I think the whole Company should be responsible, because the presumption is that the money was borrowed for the Company's use.

92. Earl of *Powis.*] How would you make the Company responsible, and not the directors?
I would make the directors responsible in addition to the Company.

93. Earl of *Airlie.*] You would make the Company responsible in money, and the directors liable as having contravened the Act of Parliament?
I think it might be done in some form or another.

94. Do you think that the Company might be made responsible in money, and the directors answerable as for a misdemeanour?
Perhaps; but I feel assured that no such case would occur.

95. *Chairman.*] Have you turned your attention at all to what are called Lloyd's bonds?
I have not; I did not know of them until this morning.

96. *Lord Steward.*] Are those securities current in Scotland?
They are not known in Scotland at all.

97. Earl of *Airlie.*] Does it not sometimes happen, in the case of a railroad that is being made, that the company, finding they have not sufficient money in hand to finish their line, apply to a banker or some person who has money to lend, to advance money to complete the railway, and it is completed in that way, the directors giving their personal security, and the shareholders afterwards meeting and agreeing to relieve the directors of their liability?
Of course, such things have been done.

98. And often done, have they not?
I do not know that they have been often done; I should doubt that.

99. How would you propose to deal with debts of that kind, because it is not clear that other outstanding liabilities cannot make the security of debenture stock less good?
I think it is different from the general question that is raised here. The case put supposes the parties forming a railway, tempted, by the fact that they have not got the requisite money to complete it, to go a little out of the ordinary course; but I have been speaking chiefly to debentures as security for money in the ordinary way.

100. Supposing a railroad has been made in that way, and the company have outstanding debts, and find it necessary besides to borrow on debenture stock to the full amount of their borrowing powers, would not the security of the debenture holders be diminished to some extent by these outstanding debts?
I scarcely think so.

101. *Chairman.*] You would not propose to give the holders of debentures a priority over the ordinary creditors of the Company?
No; I do not think ordinary and proper creditors of the Company ought to be placed behind debenture holders.

102. Earl of *Powis.*] Are they not placed behind debenture holders by the present law?
They are.

103. Do you propose to change that law?
I never could see the reasonableness of it, unless on the understanding that debenture debts were *ipso facto* preferable.

104. *Chairman.*] You are aware that, besides their ordinary liabilities in the form of outstanding debts, there are instances of railway companies, particularly in Ireland, owing money to their contractors, or borrowing money under what are called Lloyd's bonds, that is without any real security to offer for a very large amount?
Yes.

105. In such a case as that, do you think it reasonable that the holders of debentures, who have taken their debentures on the faith of their being a Parliamentary security, should be put in a worse position than they are at present?
The case which is now put to me is totally different to the case which was put to me before.

106. Earl of *Airlie.*] The case which I put to you was this: it sometimes may happen that a company may not be able to raise in shares the whole

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amount of the capital which they are authorised to raise by Parliament; in order to complete their line, having spent a certain amount of money, they find they must borrow; not having completed their line, they have not the power to issue debentures, and therefore they have recourse to the means which I have stated. But still, even when the line is completed, those charges remain outstanding as against the company.

I should say that in equity it looks as if all the parties should be alike at the same time. With regard to debentures, I think it would be a proper thing that they should be declared to have a priority of claim, and that all the debentures should be first swept off.

107. Supposing it is a matter of notoriety that a railroad has been made in this way, and there are outstanding debts of that kind, the persons who advance money upon the debentures would do it with their eyes open?

Yes.

108. Earl of *Powis.*] Do you think the present law, which confers a priority upon debentures, affords a sufficient protection to the debenture holders?

No; I think there is a want of confidence in debentures, in consequence of the present law not being sufficiently stringent.

109. *Chairman.*] Is there not in Parliament at the present moment a Bill authorising trustees to lend money on debentures?

There is a Bill in Parliament for that purpose, and I am glad that I have been reminded of that, because some parties in Scotland, greatly interested in that matter, desired me to bring it before the Committee. This Bill authorises trustees to lend money on debentures, and, if there is a sufficient protection, I feel quite confident that very large sums will be laid out in this way. I feel equally satisfied, if the law is not made more stringent, that trustees will not lend money; for I should say, speaking under correction, that a trustee would not be relieved from personal liability were he to lend money upon debentures, according to the present law.

110. Can you state what is the opinion entertained by stockbrokers, money lenders, and others, with regard to the subject of registration?

Their opinion, unanimously, is in favour of a registration, and it is strong as well as unanimous. I have not met with a single merchant, trader, or stockbroker, and I have put myself in communication with many, who is not of the same opinion.

111. *Lord Steward.*] Are you speaking of London as well as of Edinburgh?

I am speaking of Edinburgh. I am confining myself entirely to my own circle in Edinburgh.

112. *Chairman.*] Your evidence, generally, is with regard to the opinions entertained by persons in Scotland?

Entirely.

113. Have you any other suggestion to offer?

No, except to repeat strongly my opinion in favour of registration.

APPENDIX to Mr. Greig's Evidence.

Confirmatory (with a single exception) of his views that public confidence has been greatly weakened in a class of railway securities, and that a public Register of Debentures should be established, the witness put in extracts from communications received by him from the secretaries of the various Chambers of Commerce in Scotland:

Leith Chamber.—"I think that a public Register of Debentures, of a simple and cheap kind, would add confidence to money-lenders in dealing with Railway Companies."

Greenock Chamber.—"I have never heard, and have no reason to believe, that any one issue of such securities (Railway and Joint Stock Company Debentures) has taken place in this quarter. The subject is a very important one, and it is very desirable that it were placed on a more secure and business footing than it at present rests on, and it might be desirable to extend any arrangements connected with it to public bodies or corporations having statutory borrowing powers."

Dundee

Dundee Chamber.—"Any plan devised for giving confidence to money-lenders dealing with companies in general, will be a boon to the public."

Glasgow Chamber.—"The Secretary to this Chamber is unfortunately from home, and a leading director gives his opinion, but it is only his opinion not that of the Chamber. He says, 'It does not consist with his knowledge, that Debentures beyond the amount authorised by statute law have been issued by any Railway Company in the west, that the revelations in the case of the West Hartlepool Harbour and Railway Company have had no unfavourable effect on that class of securities, and that a public register of debentures would not give additional confidence to money-lenders in dealing with Railway Companies.'"

Edinburgh Chamber.—"The Chamber reported that a remedy ought to be provided against those frauds of which public companies may be guilty in issuing debentures beyond the amount authorised by statute to the injury of bondholders and the public. The plan proposed is the establishment of a public register, constructed on simple principles, which would undoubtedly operate as a sufficient check upon the Companies, and protection of innocent creditors and shareholders." They resolved, in conclusion, "to urge the Government to introduce into Parliament without delay a short remedial measure of the kind proposed."

South of Scotland Chamber.—The Secretary says—"I have long felt that lenders of money have had to trust too much to the honour of railway officials in connexion with their borrowing powers. I am quite sure a public register of debentures would give many people, who at present avoid lending on railway securities, much greater confidence is that class of investments, and I believe it would be an advantage to the Railway Companies themselves."

The Witness is directed to withdraw.

Ordered, That the Committee be adjourned to Thursday next, at One o'clock.

Die Jovis, 16° *Junii* 1864.

LORDS PRESENT:

Duke of Devonshire.	Earl of Belmore.
Lord Steward.	Lord Redesdale.
Earl of Airlie.	Lord Dartrey.
Earl of Powis.	Lord Overstone.

THE EARL OF BELMORE, in the Chair.

Evidence on Railway Companies' Borrowing Powers.

J. H. Lloyd, Esq.

16 June 1864.

JOHN HORATIO LLOYD, Esquire, is called in; and Examined as follows:

114. *Chairman.*] I believe you are a Barrister in extensive practice? I am.

115. In the course of your professional practice has your attention been called to the financial affairs of railway companies?
To a great extent, and especially their financial difficulties.

116. What is your opinion upon the state of the law with regard to companies who have exceeded their Parliamentary and statutory powers of borrowing?
I have had very little experience in cases of that kind. The most flagrant one, and almost the only one I know of, was the case of the West Hartlepool Company. I know, indirectly only, that things have been done which are contrary, I believe, to the powers of the companies; for example, that debenture stock has been issued when debentures have not been extinguished in proportion; and, in like manner, that debentures have been renewed, and new debentures issued in excess. I know it indirectly, but a case of the kind has never come before me professionally, except in the one instance before mentioned, and I believe the instances to be very rare.

117. I believe cases have come before you in which railway companies have issued what are generally known as Lloyd's bonds, in payment of contractors for work done?
Yes; that has now become a very extensively circulated security. Its origin was very simple, but that it has been applied to other purposes, which were not originally contemplated, cannot now be doubted. Originally it was simply this; take one case: a railway company had exhausted its borrowing powers; it had not been able to call up the whole of its share capital; some of its shares had been forfeited; the works had turned out more expensive than it was originally estimated they would be, and the directors were in a difficulty; the contractor refused to go on without money; they had no money to pay him; and the question arose, what was to be done? It seemed to be an obvious solution of the difficulty, that, as there was no prohibition against railway companies securing their debts, which they had *bonâ fide* contracted for the purpose of their undertaking, they should give him something in the shape of an acknowledgment, under seal, with which he could go to his bankers, or some financial body, and obtain an advance of money, and by that means be enabled to complete the line. The line being completed, the shares would be taken up, or the company would have to come to Parliament to get powers for an increase of capital, and so, by degrees, this floating debt would be extinguished. That was the idea originally. Then it came to be applied further

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in this way: suppose the railway company to have commenced its works, and then to have found itself in this position, that it was unable, first, to get the whole of its share capital subscribed, and, secondly, to have half of that capital paid up. As Lord Redesdale is aware, there is a standing requirement that this shall be done before the Company can exercise its borrowing powers. The directors are then in this difficulty; they are compelled, under a severe penalty, to complete their works within a definite time; and again, if they let the works stand still the contractor sues; the capital which they have actually expended is unproductive; the works themselves deteriorate by being allowed to remain unfinished; and the question again arises, what is to be done? The directors make this sort of arrangement with their contractor; they say, on each certificate for work done, there shall be given to you an acknowledgment of the company, under seal, that they are indebted you so much money, with an engagement to pay you interest so long as that remains a debt. The contractor takes that to his bankers, or some capitalist, and gets money upon it, and so is enabled to go on. In that way there is no doubt this expedient has been found extremely useful, and even valuable. It has spread until it has become very extensively circulated, and I believe there are bonds to the amount of some millions at this moment out among the public. There is a further use which has been made of this security, which may be called, in some sense, an abuse, though it is questionable even then whether it is expedient to restrict it. A line is projected which, perhaps, it is not worth the while of anybody to undertake with the expectation of profitable return in the shape of dividend; and yet it may be a very valuable line for opening out and developing a particular tract of country, and the like. The public will not subscribe for several reasons, first, because they are not sure of its ultimately paying; next, because they get no interest while the line is being constructed by reason of the standing prohibition against paying interest out of capital, and therefore they are in an unfavourable position as compared with other investors, and so the line would probably not be made. The way in which, under these circumstances, the object is effected is this: several gentlemen, perhaps the landowners who are interested in the matter, say, "We will subscribe so much money for which we will take shares." Then a contractor is found who says, "If you will find so much, I will engage to undertake the work, receiving payment either in shares, or in Lloyd's bonds, or in debentures, or in all three in certain proportions." In that way he makes the line; upon credit, in fact, to a certain extent. When the line is made it is either taken up by some company with whose undertaking it connects, or it is worked by itself, and earns some dividend. The shares then become marketable, the debentures are taken up, and the whole thing goes on. I believe there has not been a single instance in which there has been a failure to pay at least the interest on those bonds, if not the principal also. I am not sure that there is any disadvantage to the public in that expedient, and certainly it is not forbidden by law; it seems to be a perfectly legal security.

118. You use the expression, that it was originally contemplated that these charges should be extinguished when the line came into operation?

That is the theory.

119. In what manner do you suppose that they could be extinguished?

I imagine that the directors come to Parliament and exhibit the state of their capital, and their debts, and, subject to Lord Redesdale's investigations, which are pretty strict, they are enabled generally to get power to raise further capital if they are able to show that the debt has been contracted *bonâ fide* for the purposes of the undertaking; for example, if the estimate is found to be inadequate, and they can show that they have done nothing irregular or extravagant, then, I think, my Lord Redesdale would permit a Bill to come before your Lordships' House, and probably the Committees of both Houses would allow it to pass.

120. Would they be converted into debentures?

That depends entirely upon circumstances; supposing that the debenture power has not been exhausted at the time when the bonds are issued, probably, when the company acquire the power to issue their debentures by the fact of the whole of the capital having been subscribed, and one-half paid up, they would take

up

up a portion of those bonds, and convert them into debentures. They are, in fact, nothing more than Railway Exchequer Bonds; they are the representation of a floating debt, which is to be capitalised some time or other, and must be paid, because it is a burden and charge upon the undertaking, which cannot be got rid of except by payment.

121. Lord *Redesdale.*] Do you not consider that this mode of acting is extremely injurious to companies?

I do not know that it is; it has not struck me so. I have had great experience in railways, and I doubt very much whether it has not done much more good than harm.

122. Do you not think that numbers of companies have been excessively injured by the undertaking of such concerns as the instance which you give of a line which is not expected to be profitable being taken up in this way by a company, and created solely by the plan of issuing these bonds?

I think it is probable there has been an abuse to that extent. There may be cases where speculative men have combined together for making a line of railway; for instance, the existing line forms an angle, and instead of going along the two sides of the angle, they have struck out a line which shall form the hypothenuse and make a shorter route; and the company whose line it shortens is practically obliged to take it up. There is no doubt that existing companies have been coerced into arrangements by persons of that kind who have been enabled to do it by this system of Lloyd's bonds.

123. Do you not consider that the most mischievous person to have influence in a company is a contractor?

I am hardly prepared to answer that question.

124. Does not your evidence, in fact, go to show, that contractors having influence in companies get schemes taken up which are not profitable to the companies, or are not likely to be profitable to the companies, but which are profitable to themselves, inasmuch as they get the contracts, and which could not be made except by the power the companies have at the present moment of getting their money through the system you have mentioned?

I think if such cases exist they are exceptions; I do not know of any such cases myself personally. There are contractors, no doubt, who for their own personal objects, such as to keep their staff and their capital employed, and for the purpose of making a profit, do get up railway schemes. There is no question about that; but, then, there is this to be considered; it is very doubtful when it is done whether the public do not gain; suppose the effect of it is to shorten the route, the public thereby gain, and the landowners through whose land the line passes are benefited; what the company loses, I think the public gains.

125. Do you not think that the unprofitable character of most of the late railway speculations has tended to prevent the public giving that support to good and sound speculations which they otherwise would have done?

I think the fact is this, that the lines which are likely to pay, that is to say, those upon which it may be fairly expected that a large traffic will be brought, are already made, and that the public now see, and feel, that those which are being made are simply branches and adjuncts, which in themselves independently are not likely to produce dividends, although they may help and feed the main lines when they are brought to them. I should supplement what I said in the last answer with respect to the large railway companies by this: that undoubtedly many of those lines being made become very valuable adjuncts and feeders to them, bringing traffic upon the main lines which might not otherwise come.

126. Earl of *Powis.*] Are you aware of the discussion that took place last year in Parliament on Lord Grey's proposal, that the owners of entailed estates should be enabled to charge estates in order to take up shares and promote the construction of railways through their estates?

Yes; that Bill has passed through my hands; I was aware of the proposal last Session.

127. Does not that tend to show that there may be many undertakings of a perfectly legitimate character, which are not likely to give much return to the public

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public as investors, and which, therefore, it is of advantage should be constructed either in that way or by an expedient such as you have detailed?

My opinion from what I have seen is, that there are a good many lines which may be very valuable in themselves, but which never could be made by the aid of the public, because the public would never subscribe to them. The Northumberland Central Railway is an instance of that; they have never been able yet, by any expedient, either by Lloyd's bonds or anything else, to commence the construction of that railway. The case came before me the other day, and I found that there was no legitimate mode by which they could obtain their capital, and I advised them to wait until that Bill passed, if it passed.

128. Lord *Redesdale.*] Do you believe that, with the help of that Bill, they will get any money which will enable them to start the line?

Yes, I do.

129. Earl of *Airlie.*] In a line of that kind, the landowners, being the persons principally interested, would be the principal shareholders; in the present state of the law they find it exceedingly difficult to raise money, and, therefore, I presume very little of that money has been raised by this expedient?

There is no doubt of that; in fact, I have found continually of late, that people are very desirous of having that power, and of putting it in force. There was a line not very long ago, with reference to which parties came before Sir Hugh Cairns and myself, to ask us to consider whether the line might be made on credit by the aid, in part, of Lloyd's bonds. We said, "There is no doubt that a railway company can, for the legitimate purposes of their undertaking, incur a debt, and if they incur a debt, they may secure it." "But then," we said, "the probable effect may be, that the contractor who takes that security will make higher charges, and the question arises whether your shareholders will be content to resort to that expedient. The immediate answer was, "Our shareholders will be only too glad." In every instance I have had the same answer given, that the shareholders will never prevent it.

130. *Chairman.*] Suppose a case of this sort: a company has made a line which does not pay very well, for the sake of occupying ground, in order to prevent other companies taking their traffic from them; they resort to expedients such as you have mentioned, and borrow money to make branch lines. The result of that is, that not only do those lines not increase the revenue of the company, but, as in a case that I am aware of, the shareholders get no dividend whatever; in a case of that sort, do you think that the public advantage, which you say is afforded by lines opening up the country, counterbalances the private disadvantage to the shareholders?

My own impression is that, in such cases, shareholders should be left to take care of themselves; I do not see why the Legislature should interfere to protect them more than other people. If they choose to take shares upon those conditions, it is their own affair. I suppose that those shares will be taken by the adventurers who are engaged in endeavouring to get the line formed. The contractor, for example, takes a great number of them; he places them out among his nominees and friends; and if there is a loss upon those shares he will bear it. It will not be the public who suffer, because the public will not take the shares.

131. Earl of *Airlie.*] You think it is not the business of the Legislature to protect shareholders against the effects of their own carelessness?

I think so.

132. Lord *Redesdale.*] Of all the helpless bodies to protect themselves, are not shareholders the most helpless?

It is very curious, but the fact is, that they do not avail themselves of the means in their power. They have power to go and examine the register of debentures; they have power to examine the accounts; and they can tell by the simplest process, if they choose to exercise the necessary care, and give the necessary time to it, whether there is an over-issue of debentures or not. Yet, in the West Hartlepool Company, the men who stormed the loudest against those who detected and brought to light the fact of the over-issue of debentures were the shareholders themselves.

133. Earl of *Airlie.*] I understand you to state, that in many cases, especially of new companies, in which the estimate has been unavoidably exceeded, railroads have been completed by issuing Lloyd's bonds, which never could have been completed except for an arrangement of this kind; is that so?

I will not say they could not have been completed, but they could not have been completed without great loss, because the works must have stood still, and there must have been law suits, and so on. In fact, there have been many companies, before this expedient came into general use, whose works fell into abeyance from the want of that aid; I know several companies the construction of whose line extended over three times the period originally contemplated for it, simply because they had not the financial means of completing their lines.

134. You consider, then, that they could be completed by means of this expedient with less loss to the shareholders than by any other means?

I do.

135. Supposing they had not been able, either by these Lloyd's bonds, or any other expedient, to complete their works, the money already expended would have been absolutely lost to the shareholders?

Certainly.

136. Therefore, is it not better for the company that the line should be completed, even although they are saddled with obligations of this kind, rather than that the works should be brought to a standstill?

That is my view; but that is a matter rather for the Committee; I merely give what I know to be the effect of the expedient.

137. Lord *Overstone.*] I believe your opinion, jointly with that of Sir Hugh Cairns, has been taken professionally, as to whether what are called Lloyd's bonds are valid?

Yes.

138. I believe your opinion is that, practically, the holders of Lloyd's bonds would have an equal remedy with the holders of ordinary debentures?

Certainly. I will just state what I consider to be the legal effect of a Lloyd's bond. It is simply a specialty debt; the holder of that debt has a very ready way of enforcing it by action, and the company would have no defence, because, by the supposition, it is an acknowledgment of a debt which has been contracted for the legitimate purposes of the undertaking. Thereupon he gets a judgment, and that judgment entitles him to have execution against any moveables that there may be of the company; or he may sue out an *elegit*, or register his judgment, and so get a charge upon the undertaking. Now see the position of a holder of a statutory debenture as compared with this; the debentures have a certain period to run. The company take care to pay the interest of the debentures; they make no default in that; the debenture holder cannot sue during the currency of his debenture, because there is no default, and there is no ground for his applying to the Court of Chancery for a receiver, and even if there were a default, inasmuch as the holder of a Lloyd's bond, or a security of that nature, has power to get a judgment, the debenture holder has no advantage over him; for it has been held, that a judgment creditor has an equal right with the debenture holder who has got a judgment, and that thre is no priority in his favour as to the means of enforcing that judgment.

139. I believe the statutory bonds are limited in their amount, that limitation being in proportion to the capital paid up?

Yes.

140. Lloyd's bonds are subjected to no such limitation?

None.

141. Is not the result, then, that through the medium of an unlimited issue of Lloyd's bonds, the provision which the Legislature passed with the view of protecting the holders of statutory bonds is nullified?

It is so in fact; but it was not done with that intention; nor was it contemplated originally; the effect however is, that the holders of these bonds can go and finance with them; and so, practically, the railway companies get the means of going on with their works.

142. Is this not the result, that while the issue of the statutory bonds is limited in a given proportion to the capital paid up, there is the power of

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issuing other bonds which will rank equally with the statutory bonds, to the issue of which there is no limitation?

That is so.

143. Consequently the issue of Lloyd's bonds does virtually set aside and nullify the object and purpose of the Legislature in imposing a restriction upon the amount of the statutory bonds?

It has, indirectly, that effect.

144. Do you think that that is a result which requires any remedial measure?

That is a matter which I am incapable of giving an opinion upon. From my experience, as I have said, I should say that the advantages are greater than the disadvantages.

145. Passing on to the question of the statutory bonds, you have already stated that you are aware that the restrictions imposed upon the issue of them by law have been broken through?

I believe that in some cases they have.

146. Are you prepared to suggest any means by which that power of breaking through the law can be satisfactorily obviated?

My Lord Donoughmore was good enough to send to me a few questions, and I have considered that among others. The only way which occurred to me, as a practical one, was that of some public registration. I do not think the mere certificate of an officer of the company could give the public that assurance which they ought to have, and it would be better for the railway companies themselves, in enabling them to borrow money on better terms, if some official sanction were given to the issue of debentures. How that is to be done is a matter which requires very great consideration, and I think it would involve considerable difficulty. The railway companies are not all located in London; they are spread all over the United Kingdom, and there would be difficulty in the machinery of registration, and in this, perhaps, more especially than in anything else; when the debentures fall in and are renewed, as is generally the case, the debenture holder does not give up his debenture until he gets a new one. I do not know how the officer who has to certify is to be satisfied that the former debenture in respect of which the new one is to be issued has been extinguished or cancelled. But I would rather not give any general opinion. I should be very willing, indeed, if any scheme were laid before me, to consider it; and if any Bill were prepared, to give my best attention to it, in the hope of making it as perfect as possible.

147. You are not yourself prepared to suggest any scheme?

I think the only thing you can do is to have a registration by some public officer. I think that that would have a doubly good effect; it would prevent, although it is very difficult to prevent, an excess or abuse of their powers by railway companies in that respect; and it would give greater value to the security itself.

148. You stated in the early part of your evidence that you believe that Lloyd's bonds have in latter times been used for purposes much beyond those which were originally contemplated in the construction of them?

Yes.

149. Do you think it desirable, or can you suggest any means by which that abuse of the power of Lloyd's bonds can be prevented?

I do not know of any. As long as railway companies are not prohibited from making their works on credit, that is, of running into debt, I do not know how it can be prevented.

150. Lord *Redesdale.*] What would be the effect of these bonds if Parliament were to provide that the money borrowed under the authority of the Act should have priority over all claims of the company?

It would depend upon how the clause was expressed The late Mr. O'Connell is reported to have said that he could drive a coach and six through any Act of Parliament. If one gap is stopped up, others are opened.

151. What

151. What do you think would be the effect upon the issue of these bonds supposing there was a provision that the statutory debts of the company had priority over every other claim?

I think it would certainly check the issue of these bonds. At present in the City I know there is an idea that they are as valuable as the statutory debentures, and that they have even certain advantages beyond them; and therefore such a provision might affect the value of the security.

152. It is perfectly obvious that the only way in which a railway can be profitable is, that it shall be worked; supposing there was a power given to creditors to come in and take all the carriages and engines and the general machinery of the company, and so stop the working of the line, that certainly would not be beneficial to the creditors themselves, except so far as the actual sale of those articles might produce a certain sum of money, and it certainly would be prejudicial to the interests of all the other creditors of the company?

It has never come to that. I have never known an instance in which that has occurred.

153. But suppose Parliament were to provide that no such seizure should take place, what would be the effect of that?

If Parliament were to provide that Lloyd's bonds should not have the ordinary effect which a security of that kind now has by law, that is to say, that, even if a judgment were obtained upon it, the judgment creditors in respect of that security should be postponed to the rights of the debenture holders, and should be restricted from seizing the moveable stock of the company, of course it would destroy, to a great degree, the value of such a security.

154. Do you not think it would be a very reasonable provision to make, that no creditor should be entitled to seize the moveable stock of the company?

That would require consideration: I am not prepared to answer that question at once; the whole character of railway companies has changed from what it was originally; they were originally supposed to be merely the proprietors of a line of railway made for the benefit of the public, the public having rights over the railway. They have all become traders now; they are all carriers; they contract debts as traders and carriers. I should very much doubt the expediency of a provision which prevented the creditors of a trading company acting as traders from seizing the stock of that company.

155. You must also be aware that the public are interested in that matter; supposing any such seizure were to take place, the effect being to stop the traffic upon the line, would not that be a very great injury to the public?

The case is one which has never occurred; I suppose it would be an injury to the public, because Parliament assumes in granting powers to construct the line, that the line when constructed is for the public benefit, and therefore the stoppage of the line would be a public detriment.

156. It appears to me, that the only answer you give to my proposition is, that it never has been done, and therefore you think it never can be done; if it has never been done, and it has never been found necessary to put that power in force, do you apprehend that there would be any great objection to provide that it is a power which shall not be put in force, both on the ground of public utility as well as for the general advantages of the companies?

My experience enables me to say with some confidence, that there are many powers which are capable of being exercised, and which are, in fact, never exercised, but which nevertheless are very efficacious; for instance, the very fact that you can enforce this security against a railway company, and the knowledge of the company that it may be enforced, compels them to meet the demand and to satisfy it in some way.

157. Do you not think it would be desirable to prevent the demand arising, and prevent persons having this facility, as they think, in getting money unquestionably upon that which never was contemplated by Act of Parliament?

No.

158. *Lord Steward.*] Would it not, in your opinion, be unjust to deprive the existing creditors of any portion of their security which they now enjoy?

I should think that any legislation in that respect would not be retrospective.

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When the Act was passed, prohibiting loan notes, it preserved the rights of the holders of those securities at the time. I think there is one protection to the public which has not been adverted to: I know that railway companies have a very salutary dread of Lord Redesdale when they have to come before him to explain their financial statements. I think that check is as effectual as almost anything.

159. Lord *Overstone.*] Have I correctly gleaned the purport of your opinion to be, that it is not in the power of the Legislature to put an effectual restriction upon the borrowing powers of the companies, from the fact that if they want to borrow, they will find the means of borrowing?

I am afraid you will find it done in some way. I do not believe that, unless there were an absolute prohibition against going into debt, you could prevent the companies in some way or other raising the money.

160. Is it a legitimate conclusion from that opinion that you go to the extent of thinking that it is unwise in the Legislature to attempt to put any restrictions upon the monetary proceedings of the companies, but that it would be better to allow them to proceed in their own way, and to exercise their own judgment upon the manner of their proceedings?

If we had to begin again, I should answer that question decidedly in the affirmative, because my own experience has led me to the conclusion that people now-a-days are able to take care of themselves; at all events if they do not choose to exercise the common vigilance which, as prudent men, they should do, I do not see why the law should help them. There was a time when all companies were considered to be nuisances and monopolies, and there was not only a feeling against them, but the law interfered to prevent their constitution. Then an exception was made in favour of companies having objects of public utility in view. Still, though recognised and permitted, they were fettered and restricted in accordance with the feeling which existed against companies. That restraint of Companies has been extensively relaxed, and now, by the Companies' Act of 1862, men may associate together for any purpose; they can frame their own articles of association, and regulate their own financial affairs; they can borrow to any extent; they can do almost what they like; and the only companies who are now under restrictions are railway companies, canal companies, dock companies, and the like, who are obliged to come to Parliament for certain powers, so that, in effect, those bodies which, according to former legislation, were most favoured have now the least freedom and independence of action.

161. Whilst you adopt that simple principle to its full extent, you feel that the course hitherto pursued creates great difficulty and obstruction in the application of that principle?

Quite so.

162. That being the present state of things, do you think, then, that the obstruction in the application of that principle, arising out of past proceedings, creates a legitimate demand for some measure to protect those parties who are lending their money, and who are liable, at present, to lend it upon securities which do not turn out to be of the character which they are led to believe?

Yes; I should say that is a legitimate conclusion. I should say that, perhaps, it is proper that those who are supposed to be protected by law should have that protection made effectual.

163. Then, having arrived at that point, you do not feel yourself in a position to suggest any further remedy?

With reference to railway debentures the only thing I can suggest is registration.

164. But you are not prepared to suggest the particular form of registration?

I should be very happy to consider it; the principal difficulty that I feel is what I mentioned before as to the renewal of debentures and the creation of debenture stock.

165. Lord *Redesdale.*] Debenture stock is never sent again into the market, except according to the value that it may bear?

I believe

I believe that occasionally debenture stock has been issued, and that the debentures for which it was to be substituted have not been immediately extinguished. *J. H. Lloyd, Esq.* 16 June 1864

166. Then the company have exceeded their borrowing powers?
The company have exceeded their borrowing powers; but the practical difficulty I see is this: that, with regard to those debentures which have expired, and which the Company have a right to renew, or to issue debenture stock for, parties who hold them will not give those up until they receive the substituted security.

167. Lord *Overstone.*] Have you considered the position in which the creditors of a company are placed in those cases in which the companies have exceeded their borrowing powers, first, by issuing debentures beyond the sum which they are entitled to do, and, secondly, by issuing fresh debenture stock and not cancelling the former debenture bonds?
I do not think the debenture holders need suffer. In the first place, it is somewhat doubtful whether even the over-issued debentures would not be legally available, because it is very difficult to earmark that which is in excess; but in any event, if the issue were held to be *ultra vires*, and therefore not binding upon the company, it is quite clear that the directors who had done an act of that kind, would be personally liable, and that is one of the safeguards that exist. I have not the least hesitation in saying that, let it be established that debentures have been issued in excess of the powers of the Company, and that the holders of those debentures have been unable by reason of that to obtain payment of them, the directors would be personally responsible.

168. Did that turn out to be the case in the West Hartlepool Railway Company?
The parties did not try it.

169. Do you believe that if they had tried it, the directors would have been personally liable?
I am quite certain of it.

170. Take the case of a company which increases its debenture stock, and does not effect a corresponding cancellation of its debenture bonds for that stock, could the holders of that stock proceed against the directors personally?
It is quite clear that the holders of that debenture stock would never be in any difficulty, because the very fact of the registration of the stock is sufficient for them. The only question is whether the holder of the debenture not extinguished would retain his right. He would clearly have his right at law; I do not think he is in any danger. The only persons who might suffer are those behind, namely, the preference shareholders and the ordinary shareholders who have a larger amount of interest put in priority than they ought to have; they are the persons who suffer; but they can easily protect themselves by an examination of the register.

171. Earl of *Powis.*] With regard to the difficulty which I have suggested of registering the renewal of debentures, from the fact that the holder will not part with the old one before he gets the new one, might it not be possible to meet that, by allowing the company to obtain new debentures from the public registrar, whoever he might be, upon a certain bond or penalty to produce the old debentures within a given time, such as a fortnight or a month?
Yes; but that would be a circuitous mode, and one not very satisfactory. I should endeavour to devise a simpler mode; that the Company should give a receipt to the holder of the expired debenture, which, if they did not substitute a new debenture or otherwise satisfy, should be equivalent to the debenture itself, and be equally enforceable. Something of that kind might be done. I have no doubt that if one were to set about devising a mode of doing it, it might be done; but we lawyers like to have pen and paper before us.

172. Do you consider that difficulty would be an insuperable one, and preclude any attempt at establishing a system of registration?
Certainly not; it is only a difficulty of machinery.

173. Is the holder of a debenture in a worse position, as compared with the holder of a Lloyd's bond, or a specialty debtor, than the mortgagee of an

entailed estate would be against a person who had a judgment debt, or against an extravagant tenant for life?

Yes; he is in a much worse position, because the debenture holder is not a mortgagee of real property. In the case of a mortgage of land, you have power to enter by ejectment; but a debenture holder cannot take the land itself; he has no right over the land; his security is confined to the undertaking and its tolls; it does not even affect the moveable stock; it creates no lien or charge upon that. That has been decided. It was decided also in the case of Russell *v.* The East Anglian Railway Company, by Lord Truro, that if a judgment creditor gets in, and a receiver is afterwards appointed by the Court debenture holder, the receiver has no priority; so that, in truth, from the difficulty of establishing a case to get a receiver, and from the fact that there is no specific charge on the land itself, the holder of a Lloyd's bond, who by diligence gets judgment first, is in a better position than the debenture holder.

174. So long as the Legislature thinks it politic to place a restriction upon the amount which a company may borrow upon mortgage, do you think it will be unfair or inexpedient to give the debenture holder such priority and such advantages of position as the mortgagee of a landed estate holds?

That is a question which I have not fully considered, but it would certainly give a much better security to a mortgage debenture holder, because he would have his specific charge against the estate which could not be superseded by a judgment. A judgment registered becomes a charge. If mortgage debentures constituted a specific charge upon the land and real property of the company, then of course they would retain that priority. There would certainly be an advantage in that to the holders of debentures.

175. Earl of *Airlie.*] In the case of Lloyd's bonds being issued for the purpose of enabling a railway to be completed, is there any concealment of the fact of those Lloyd's bonds having been issued?

It depends entirely upon the Board. If they are candid they will tell their shareholders; but if there is any object in concealing the fact, they will not. The accounts ought to show it, because the interest account will tell you what they are doing.

176. The accounts are submitted to the shareholders at the half-yearly meetings, are they not?

If the shareholders choose to open their eyes, they can always find out from the interest account what is going on; but shareholders in general are very inert. Moreover, they do not like to raise questions which may affect the value of the undertaking and so damage the price of their shares in the market.

177. Do you think, as a matter of fact, that any person wishing to invest money in the debenture stock of a railway company would have any difficulty in ascertaining whether there were outstanding claims of this kind against the Company?

Not the least.

178. Duke of *Devonshire.*] Did I understand you rightly to say, that you do not believe it is very common for companies to issue irregular debentures, or debentures beyond what they are authorised to issue?

I have never known more than two or three instances.

179. In general, when they have borrowed to the full extent to which they are authorised, they would resort to Lloyd's bonds?

I think it is very rare indeed that there has been an over-issue.

180. Do they usually pay a higher rate of interest upon Lloyd's bonds than upon the authorised debentures?

Yes, I think the general rate of interest on Lloyd's bonds is five or even six per cent.

181. Are they issued by any of the large companies?

Not such as the North Western or the Great Western; I never heard of it. I cannot say that some of the new companies, who may be called large ones, who are in the course of constructing their lines, have not had recourse to it. It would be difficult to say that. I do not think any of the old companies have had recourse to them.

182. Lord *Overstone.*] Are you aware that the Committee which sat last year reported as a modified protection to the debenture holders, that there should be a semi-annual declaration in the "Gazette" of the state of the borrowing by the Company, and an endorsement upon each bond, which of course would not render it impossible for the Company to issue debentures beyond their borrowing powers. Do you not think that such a declaration and such an endorsement would restrict the directors from being guilty of any misconduct to a very considerable extent, by the fact of their misconduct being palpably and continually before their own eyes?

I think no man having any regard to his position and character, would certify that which he had not ascertained to be true.

183. Then all the danger of exceeding the legal borrowing power which may arise *per incuriam* would be at all events obviated?

Yes.

184. And a considerable restraint would be put on immoral tendencies not fully developed?

I quite agree; the only thing which occurs to me upon that suggestion is this: it has been proposed that a party knowingly making a false declaration shall be guilty of a misdemeanour; I doubt very much whether that will be a desirable thing; I think you must leave it very much to men's honour.

185. You think that moral punishment would be better than legal punishment?

Yes.

186. Earl of *Airlie.*] Would not the effect of requiring a declaration of that kind be that in many cases you would not get men of character to act as directors of these small companies, because they would be obliged to sign such a declaration?

It is, of course, always desirable to have men of character on the direction.

187. Lord *Overstone.*] Might not that argument be equally applied to requiring a half-yearly account?

I do not think that a man of character would be deterred from becoming a director of a Company, because it might be to the interest of the Company that he should do something which he would consider wrong; for, being a man of character and position, he will not be deterred by that consideration, inasmuch as he knows that he would not do the wrongful act.

188. Lord *Redesdale.*] Do you not think that much of the bad management of Companies has arisen from the facility which they have in general found in coming to Parliament and getting all their errors set right?

They do not always succeed in that; but there is no doubt that the hope of being able to do it operates strongly upon Companies.

189. Do you not think that it will be desirable that some public provision should be made by which Railway Companies could be bankrupted, and their concerns wound up?

I do not think that would be better than the power which they have at present, to come for a Bill to wind up.

190. They come for a Bill by which they are to get their evil deeds countenanced and forgiven, and some remedy found to enable them to go on; do you not think that it would have a wholesome operation upon the management if they knew that their creditors could, under certain circumstances, proceed to bankrupt the concern, and compel them to wind it up?

That is a strong power; it might be a very terrible one; there is no doubt that it would be very efficacious, but whether it is desirable to put such a power into the hands of persons is another question; it might be tyrannically used.

191. Do you not think it would lead to more prudent management on the part of those who have the direction of the concern?

Yes, it might; but on the other hand, it may be very doubtful whether it is prudent to put such a weapon into the hands of a dissatisfied man; take the case of a single dissatisfied shareholder; suppose such a person had this weapon

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put in his hands, it might make him all powerful; I should doubt the wisdom of that.

192. That is a remedy which would not be given to shareholders, but would be only given to creditors?

It is very easy to stimulate a creditor, and very easy to become a creditor; I think that is a dangerous power.

193. Do you not think it might be beneficial to the public in many cases, that a Company which might be in very great distress should fall into hands which are more capable of managing it, rather than it should be embarrassed with the former management, endeavouring to get out of their difficulties?

But how is that sale to be effected? I do not see any mode by which it could be effected; I do not see any mode by which it could be done; assignees under a bankruptcy could hardly carry on the concern themselves.

194. The concern might be sold to another Company, and the effect would be, that a Company would be established to buy the old concern; would it not be more beneficial to the public that it should be carried on by a new Company who come in with the advantages of being free of the difficulties of the old Company, rather than it should remain in the hands of the old management?

On the other hand, supposing it were a bankrupt undertaking, and were sold to a new Company, the new Company would expect to get it very cheap, and the persons interested in the old Company would suffer by that.

195. Is not the way in which every other money concern is carried on, that they are subject to the danger of bankruptcy, and being compelled to wind up their affairs?

Yes, no doubt every trading Company is subject to that, and every trader; I should not like to give a positive opinion upon this point, without further consideration; it is too important a question to be dealt with hastily.

196. That has reference to the questions which I previously asked you as to the manner in which it might be expedient to prevent any seizure which would interfere with the working of the Company; but instead of seizing that which would interfere with the working of the Company, there should be a power given to the creditors to compel the winding up of the whole concern. The whole concern should be sold if they think fit, there being no divisible fund to pay them that which is due?

I would rather have time to consider that question; I do not like to give an opinion upon that at present; it is a very important question.

197. Earl of *Powis.*] Considering the connexion of one line with another, do you think it desirable to give such a power of making a Company bankrupt, which, if exercised in the case of a Company having an intermediate link, might paralyze other Companies whose lines lie beyond the portion of the line seized?

Perhaps, the practical effect of that would be, that the Company whose interest would be affected by it, would become the purchasers on better terms than any other. Very likely that would cure itself, but I confess I have great misgivings as to such a power being conferred upon a creditor, or a body of creditors.

198. Would not such a bankruptcy proceeding, even in the case of a speedy purchase, stop all communication upon the line for a time?

That might be arranged; of course there might be a temporary arrangement for the working of the line so as to prevent that.

199. Lord *Steward.*] You think there is such a difference between railway companies and ordinary trading companies, that there is scarcely any analogy between them?

I should say so. Railways are the great communcations of the country; you cannot stop the public roads. There is this difference between a Railway Company and any other company, that a Railway Company are the proprietors of a main trunk-road over which the public have rights of way. You cannot deal with the public roads of the country in the same way as you can deal with trading stock. You must keep open those communications, because any interference

interference with them would be very dangerous and very injurious to the public. It is a matter which I can hardly bring my mind to entertain.

200. Earl of *Airlie.*] I am not sure that I made myself clearly understood with regard to the declaration that the Committee recommended last year; I referred rather to the case of existing Companies who have outstanding liabilities; at present there is no obligation upon the directors to sign any declaration. Supposing a Company with outstanding obligations, and you made it compulsory upon the directors to sign a declaration that there are no outstanding liabilities, how can they make that declaration consistently with truth?

That might be a very useful check.

201. Would you make the obligation retrospective?

I would make it compulsory upon all companies in existence. I do not see the least objection to it. If they cannot so certify there must be something wrong; that is pretty clear. Reverting to the subject of Lloyd's bonds, it is a very curious thing that I have never yet known any instance of mischief arising from the use of those bonds. In 99 cases out of 100 it is to the interest of all concerned that the Company should not be brought to a stop. It is just as much for the interest of the debenture holders and the shareholders, as it is for the interest of anyone else, that the undertaking should go on; and if there are no available means of carrying it on, and enabling the line to be completed, but by a financial operation of that sort, I do not see that there is any disadvantage in it.

202. Do you say that there is no disadvantage from the issue of Lloyd's bonds?

I do not see any.

203. How is it possible for the directors of a company which has Lloyd's bonds outstanding to sign a declaration of the kind which was recommended by the Committee of last year?

I thought the declaration was simply that they were to certify what amount of money they had raised by borrowing.

204. *Lord Steward.*] Did I correctly understand you to say at the beginning of your evidence, that although you thought the good done by Lloyd's bonds preponderates over the evil, you still admitted that there was some evil attendant upon the issue of Lloyd's bonds?

I said that possibly there was an abuse. I do not know that it is an evil, because I said the evil to the shareholders seemed to be counterbalanced by the gain to the public.

205. Earl of *Airlie.*] Take the case of a company who issued debentures to the full extent to which they are authorised to issue them by Parliament, and to have in addition certain Lloyd's bonds outstanding; could the directors of a company in that position sign a declaration of the kind?

They could, because they have not raised money upon those bonds. They have merely given them to secure a debt.

206. Then, in point of fact, this declaration amounts to nothing?

Yes, it is quite clear that they cannot *raise money* upon Lloyd's bonds now; that would be an evasion of the 7 & 8 Vict. c. 85. They do not in fact borrow money upon them. There is always a certificate that a debt is owing in respect of certain work done or goods supplied, or the like.

207. Do they not obtain money in order to discharge that debt?

They come to Parliament for that. They must pay it out of their revenues if they cannot get it in any other way. It is precisely the unfunded debt of the railway companies, which they must fund at some time or other.

208. Lord *Overstone.*] Suppose the case of a railway creating an amount of Lloyd's bonds, and not handing them over to the contractor, but themselves selling them in the market and obtaining money upon them; what would be the effect of such a proceeding as that?

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I think that is only a way of doing directly what they do indirectly. They would be given to the contractor by name. The bonds would be in the name of the contractor and would purport upon the face of them to be given for work done.

209. Is the bond so drawn as to require the endorsement of the contractor?
Not at all. The bond is not a negotiable or assignable bond, and in that respect it differs from the statutory debenture. That is one advantage which a statutory debenture has over it. But although not assignable at law, it is assignable in equity, therefore whoever holds it can always use the name of the original obligee to sue upon it. That is done now, so that it does not require any endorsement.

210. That returns to my first proposition: suppose the bond were created in the form of a bond to A. B., a contractor, for a given sum of money in respect of work done, and that that contractor never handled the bond, but that the Company sold it in the market, what would be the result of that?
I do not think it would make any difference if the bond were really given for work done, and it bore the contractor's name; the directors, as the agents of the contractor (for that is what they would say they were), would go into the market and sell that bond for him.

211. So that Lloyd's bonds, although they purport to be issued only in consideration of work done, can practically be issued in consideration for money received?
Not unless there is a debt; the bond is founded upon an existing debt. There can be no Lloyd's bond issued until a debt has been established; it would be void if it were.

212. But what is there to prevent the possibility of a Lloyd's bond being issued purporting to be for work done, but falsely so purporting, and the directors obtaining money upon it by a direct sale of it in the market?
I do not know that there is anything to prevent that, if the directors were determined to act wrongfully.

213. *Lord Steward.*] But that would be a fraud, would it not?
Yes. They are strongly advised by me and others that they cannot do that, and that they would make themselves personally responsible if they did.

214. Lord *Overstone.*] Would not the obligation upon them be stronger with regard to that than it is with regard to their issuing statutory debentures beyond their legal powers?
I do not think that railway directors are likely to do it when they are told expressly that what they are doing is at their own peril, and that they subject themselves to personal liability if they do it. An overissue of debentures is a very exceptional case indeed; and I should say that any such abuse of Lloyd's bonds, as is suggested, purporting on the face of them to be for debts contracted, but being in fact given for the purpose of raising money upon them, is scarcely likely, because I believe that no railway directors would subject themselves to the consequences—none that I know, certainly.

215. Are not the relations that arise between the contractor and the Board of Directors frequently such that the transaction might be carried on ostensibly in consideration for work done, but really and truthfully for the purpose of raising money?
I believe the indirect effect now is, that it is a means of raising money. I believe, as I said before, that the contractor, when he gets these bonds, goes and melts them. I dare say arrangements are made beforehand that they shall be disposed of at a certain price; I can well understand that, but I do not think that any body of directors, or any respectable men, at all events, would say, We will make a pretence of your having done the work, and will issue bonds to you as for work done in order to use them for raising money.

216. Do you think it will be done in much the same way as will bills of exchange, which distinctly bear on the face of them that they are drawn "for value received," when, in fact, no value is received?
I do not think so; I can assure the Committee that the first question put, and

and the answer to which is most anxiously looked for, is, "Will the directors by doing this incur any responsibility;" that is always one of the questions put.

217. Duke of *Devonshire.*] Are they not in the habit of issuing them for work done, or for the payment of rolling stock, or the purchase of land?
Yes.

218. For any purpose authorised by the Act?
For engineers, surveyors, solicitors' bills, or anything of that kind which constitutes a debt, and which could be sued for at once.

219. Earl of *Airlie.*] Take this case, which I believe sometimes happens, that the directors, in order to get a railway completed, obtain advances upon their own personal security, and then come to the shareholders, who agree to relieve them of that liability; supposing there is that charge outstanding against the company in addition to the amount of debenture debt which they are authorised to raise by Act of Parliament, could the directors honestly sign this declaration?
That depends upon the form of the declaration; cases exist of directors having made large advances, which are partly uncovered.

220. Lord *Overstone.*] A form of a Lloyd's bond has been put into my hands, in which it is set forth that the company consent to postpone the payment of the debt for a period of 24 calendar months from the date thereof, and that they have agreed to enter into the bond and acknowledgment; but then, attached to that bond are a set of coupons running, not for 24 months but 48 months; can you explain that?
There must be a mistake in that: the annexation of coupons at all is quite a novelty; Lloyd's bonds never had anything of the kind originally. Some of them lately have had coupons attached, but it is certainly contrary to the idea of security. The annexation of coupons is quite recent; it is done for the purposes of the market.

221. Earl of *Airlie.*] Do you consider that there may be outstanding charges against the company for the amount raised by the company?
Yes; I think those words would not prevent a declaration such as has been referred to, although there were bonds out to cover debts; my usual form of bond is simply this, that the company acknowledge themselves to be indebted to A. B., a contractor, for work done and performed at their request for the use of the undertaking, and that in consideration of the forbearance of the contractor for the period hereinaftar named, the company engage upon such a day to pay the amount and interest in the meantime.

222. *Chairman.*] Have you any objection to put in a form of a Lloyd's bond, drawn by yourself?
I will do so.

The Witness delivers in the same, which is as follows:

FORM of a BOND or OBLIGATION,

As settled and approved by Mr. *Lloyd*, now commonly known as a "Lloyd's Bond."

THE Railway Company hereby acknowledge themselves to owe to A. B., of , Contractor for Public Works, the sum of for works executed, and materials supplied by the said A. B. to the said Company for the purposes of their undertaking; and the said Company, in consideration of the premises and of the agreement of the said A. B., to forbear and give time of payment of the said sum of , until the day and year hereinafter mentioned, hereby undertake to pay to the said A. B., his executors or administrators, the said sum of on the day of 18 , with interest, in the meantime at the rate of per cent. per annum, by equal half-yearly payments.
Given under the common seal of the Company, this day of 18 .

L. S.

N.B.—The above form would be subject to variation according to circumstances not affecting the substance and general tenor.

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223. Do you hold in your hand a paper which is a copy of queries on case, and joint opinion of Sir Hugh Cairns and yourself with regard to the several points raised in it, given with reference to a certain Railway Company whose name is not specified, and referring to the general validity of these bonds, and also to the personal liability of directors who may issue them?

Yes; and I adhere to that opinion now. The same questions have substantially been before many other counsel, both without me and with me, and there is a concurrence of opinion in respect of their validity.

The Witness delivers in the same, which is as follows:

" Railway Company.

"Copy Queries on Case, and Joint Opinion of Sir *Hugh Cairns* and Mr. *J. H. Lloyd*, thereon.

"COUNSEL will please advise the Directors—

"1. What are the rights of the obligees at law and in equity under the bonds commonly called Lloyd's Bonds (A.), as against the property and assets of the Company (B.), as between themselves and (C.), as against the ordinary debenture holders:

"2. Whether the Directors can in any way be held personally liable upon them beyond their liability as shareholders: and

"3. To advise generally.

"OPINION:

"The holders of these bonds can sue upon them in the name of the original obligees, and if they have been *bonâ fide* given as a security for the payment of monies owing for work done, or supplies furnished to the undertaking, there would be no ground of defence to the action, either legal or equitable, and judgments could be recovered upon them, which might be enforced, either by execution against the effects of the Company, or, failing such effects, against the shareholders, to the extent of the amount unpaid on their shares, or might be registered and become a charge upon the lands of the Company. In any conflict between the holders of these bonds and holders of statutory debentures, it would, we apprehend, be practically a question of more or less diligence. The debenture holders would have a direct and prior charge by virtue of their debentures upon the whole undertaking, but their available remedies would be no better than those of other creditors, except in the power to get a receiver appointed.

"There is no ground whatever for supposing that the Directors incur any personal liability by issuing these bonds. The only question which could arise would be this: it would be competent for any one or more of the shareholders to apply for an injunction to restrain the Directors from entering into a contract for the execution of works on the terms of payment by Lloyd's Bonds, on an allegation that it would be an improper and unauthorised mode of carrying out the undertaking, and likely to be onerous to the shareholders in respect of the price to be paid for the works, &c.

"But, practically, we presume there is no reason to apprehend any objection from shareholders, and if no such application be made by them, the only risk is removed, because the bonds, when given, would be unimpeachable.

"*H. M. Cairns.*
"*J. H. Lloyd.*

"Lincoln's Inn, 8 Feb. 1863."

224. Have you any further suggestions to offer?

I have not.

The Witness is directed to withdraw.

THE HONOURABLE WILLIAM NAPIER, is called in; and Examined as follows:

Hon. W. Napier.

225. *Chairman.*] WHAT office do you hold in connection with the Lands Improvement Company?

I am the managing director of the Lands Improvement Company.

226. I believe you have turned your attention to the question of how the best means may be devised to prevent Railway Companies from exceeding the amount of their borrowing powers as conferred upon them by statute?

I have not had any what may be termed professional experience in such matters,

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matters, such as the experience of a banker, broker, or railway director; but at the same time I have been called upon in past years to assist in devising financial schemes for relieving Railway Companies from their difficulties. In the course of that experience my attention has been drawn to the present position of the holders of the bonded debt of Railway Companies; and I have naturally, therefore, formed my opinions, which must be only taken for what they are worth, as to what may be done, for the future, to protect the public on the one hand, and Railway Companies on the other. I consider that the present position of the holders of debentures is exceedingly unsatisfactory; I think that by the kind of shield which Parliament has thrown over the debentures the public are led to believe the debenture holder has a greater protection than he really has; it is necessary, therefore, to take some steps either to limit the protection which Parliament gives, and to leave investors to exercise their own judgment simply, or else to establish a really safe and sufficient protection, so that when a debenture holder has paid his money he may know the Railway Company cannot deprive him of the interest of his money; and as people who hold these debentures are, to a great extent, persons investing moneys for their children or for their clients, or for those who are unable to protect themselves, it is doubly necessary that some such protection should be given. On the other hand, I think the shareholder requires a very great deal of protection as matters now stand; he also believes his dividend can only be superseded to a limited extent, that is, to the extent of the interest on the debentures, and to his great regret he finds perhaps that by all kinds of processes, such as acknowledgments of debts, by the creation of preference shares, and by many different devices, his shares are practically worth nothing, and the consequence is, he sells his shares and makes a sacrifice. The shares are then bought, not by people who looked forward to obtaining the interest or dividend upon the shares, but by persons who buy them for their speculative value, and who look to their profit, not as I say from any dividend or interest upon the shares, but to a rise and fall in the value of the shares; therefore, I think the shareholder is as much in want of protection as the debenture holders. Then, I think, if you look to the Railway Companies themselves it is almost doubly to their interest that they should be compelled to take what I may call an entirely honest course in these matters. I think if they saw they had more facilities for borrowing than they now have, and those were to be their only borrowing powers, they would make better arrangements in advance, and they would not be so speculative in their undertakings, and that they would raise the money they require on the average at a much lower rate than that at which it is now raised. Parliament has limited the borrowing power to one-third. I presume no one can say that the owner of property should be limited to one-third. He is entitled to go much further. Railway Companies cannot borrow to a greater extent legitimately, but they evade the law by giving acknowledgments of debt, which, I presume, have preference as against the property of the company to the debentures, which are, after all, merely companies' obligations, and by adopting this system of acknowledgments of debt, the Railway Companies no doubt raise the money they require; but they raise it at a very great sacrifice, which ultimately costs the united interests a far larger sum than it would cost if the Railway Company were allowed to borrow to a greater extent, but guarded in such a way they could not easily evade the provision of the law. It would make them more prudent, and would enable them to get all the money they require at a lower rate of interest. The question how to attain that end is very wide and difficult, and I am not sure any experience which I have may be at all worthy of the consideration of the Committee. If the Committee wish to know what my opinion is, as far as it is worth, I am quite ready to give it.

227. Lord *Overstone.*] Is it your opinion that, both as regards the interest of the bondholders and the interest of the shareholder, some further protection to them should be given, and that that protection would be best found in extending the present power of borrowing, but rendering the power so extended more strictly defined?

That is my clear opinion.

228. Do you think that it is possible positively to limit the borrowing powers of companies?

 Certainly,

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Certainly, I think that might be done.

229. If the directos are anxiously determined to borrow, do you think that you can, by any legislative language, control and effectively limit that tendency?

I may be wrong, but I think that could be done.

230. I put that question to you because we have had a witness before us of great experience, who thinks that the borrowing sagacity can beat the sagacity of the Legislature?

I think it is quite possible the law may be evaded to a certain extent, but I do not think it would be tried, if a more extended power were given for issuing bonds, and those bonds were registered, and were constituted a charge upon the property, which they are not now, except in an indirect way, as then any debts, or acknowledgments of debts by the Company, would only take rank, as it were, after the bonds according to the date of their claim.

231. Do you think it would be practicable to establish an effectual registry which should include all species of borrowing resorted to by Railway Companies?

I think if Parliament went to the extent of giving Railway Companies the great privilege of registering their debentures in a Government Office, and of allowing a greater issue than at present, it would be quite right and fair that those debentures being constituted a charge upon the property of the railway, and not merely the bonds of the company, Parliament should throw such protection over those bonds as might be legitimate; I think they could do it; they might say that such other debts as were created by the Railway Company should be postponed to the registered debentures.

232. Do you think it would be expedient to provide that all the borrowing powers of a Railway Company should be uniform, and that they should be unlimited in extent, but be subjected to a positive obligation to clear and distinct registration accessible to the whole of the Company?

I think that that is giving a very comprehensive and wide construction to what might be beneficial; I should hardly be disposed to assent to their going so far as they would wish themselves; I think if they were allowed to issue to the extent of two-thirds of their capital unregistered debentures, that practically would enable them to accomplish all they require.

233. Is not the establishment of any particular limit, either one-third or two-thirds, necessarily vague; is it not better to leave that to be a question to be settled between the borrower and the lender, only taking care that the lender shall have full means of knowing what the borrower is doing?

I am not prepared to say that that view is not correct; but I should have thought there are so many persons who act upon a kind of faith, as it were, in Parliamentary protection, it might have been better to have limited the amount, although I quite admit the truth of the assertion, that, as a matter of principle, it is better not to impose such a limitation.

234. What reason would you assign as the necessity for altering the limit of the borrowing power from one-third to two-thirds?

I think the present limit of one-third is so utterly inadequate that it has led to an evasion of the law by all these means of acknowledgment of debt which ultimately deprive every one of their interest; but if the borrowing power is extended to that reasonable proportion, which any man can obtain upon his own property, whether it be freehold or leasehold, some kind of protection would be fair to the lender. I think it is not desirable, therefore, to limit the issue of registered debentures to two-thirds. Your Lordship has laid down a principle which I think is a fair one in theory; but it is better, at all events, in the first instance, to have some limit, such as experience has shown should be given, in raising money upon property of different kinds, whether belonging to private individuals or to companies.

235. When you speak of limiting the borrowing powers of companies, have you in view what are called Lloyd's Bonds?

I think, practically, no more Lloyd's Bonds would be created if such a course were

were adopted. I imagine that Lloyd's Bonds have arisen somewhat in this way; a speculation is got up for a railway, which may or may not be a very good thing, or circumstances at the time it is brought out may be against the placing of the shares, and a certain number only are placed, or a certain amount of debentures only can be issued, and the whole undertaking is in a state of suspense, the parties who have subscribed their money may probably lose the whole if it cannot be completed, and, therefore, these acknowledgments for debt, in the shape of Lloyd's Bonds, are created; they are placed at an enormous sacrifice in order to get the railway completed, and ultimately debentures are issued; but the result is, that it is a great cost to the shareholders, to the owners of property generally, and to the company; and, after all, if any unexpected circumstance, such as hard monetary times, overtake them in the middle of its operations, the whole company may be in a state of dreadful ruin. For those reasons, I think if you give companies debenture powers sufficient to enable them to raise the money they require, and make it difficult for them to raise the money in any other way, you have given them sufficient in saying they may raise two-thirds.

236. A power of raising money by debenture is only a substitution for raising money by shares?

It is only a substitution to a certain extent.

237. If parties associate themselves together as shareholders, for the purpose of carrying out a concern, why should they not be thrown upon their own resources to carry it out through the means of shares, rather than through debenture bonds?

I think there would be a very great difficulty if there were no debenture powers. I think it would be undesirable to hinder companies from having borrowing powers, for borrow they would, in some way or other.

238. You think that borrowing by means of debentures is, in reality, one of the forms by which credit is brought to assist a capitalist who has not capital to a sufficient extent to carry out the whole concern, but sufficient to start it, and stand the risk of it?

Yes; and whatever Parliament might do, as it were, to hinder them from exercising borrowing powers, Parliament would not succeed, and Railway Companies would borrow money, and would create debt, and therefore it is better at once to acknowledge it, and to put it into a definite shape; and having done that, to make it perfect in order to protect all the different interests, or at all events as perfect as human ingenuity will permit.

239. Then, on the whole, your opinion is, that it will be desirable to give borrowing powers to the extent of two-thirds, that being the ordinary margin taken with reference to good mortgage securities, and to subject the borrowing powers so extended to clear, distinct, and stringent restrictions.

I do.

240. You think by that process you would eliminate many of those objections to the form of borrowing which are now entertained upon the part of the lender?

I do.

241. Earl of *Airlie.*] You say that two-thirds is the ordinary margin now in the case of money lent upon good security, such as fee-simple?

I believe that in the case of leasehold property, it is from one-half to two-thirds; and in the case of freehold property, from two-thirds to three-quarters.

242. That limit was, originally, not by any provision of the Legislature, but by the discretion of the people who lent money.

Yes; it is arrived at simply in this way, the margin of one-third is considered to be sufficient to provide for the fluctuation in the value of the property which must occur from time to time according to the state of trade, or public prosperity, or the reverse.

243. Why should you not put the property of Railway Companies upon the same footing, supposing there is full publicity given to registration, as the result to be arrived at also by the lenders of money exercising their discretion?

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16 June 1864.

Because I do not think the lenders of money are always in a position to exercise their entire discretion. I think there is a great difference as against one individual borrowing money from another person. The whole transaction is between them alone. I think, usually speaking, that a man does not go himself to make the necessary investigation before lending to a Company; he refers it to his solicitor, or broker, or to some gentleman who is professionally acquainted with these matters. Those very persons are often receiving an interest from the Railway Companies for the placing of the debentures; and I think it would be a protection to the persons who make those investments on the part of their clients to know that there is a limit, and that they should not be tempted by their self-interest, as it were, to place more than might be safe in the interest of their clients.

244. *Chairman.*] Are you aware that in the wording of Lloyd's Bonds, it is specified that the debt has been incurred for work done and materials supplied by the person to whom the bond is given for the purposes of the undertaking?
I am.

245. Are you of opinion, that in the case of a Railway Company issuing acknowledgments of debts, such as Lloyd's Bonds, or any other name that they may be called by for money lent, and not *bonâ fide* for debts incurred for work done, those certificates would have legal validity; first, against the joint assets of the company, and secondly, against the directors personally.
I think the effect of these acknowledgments of debt is to go further, and to give a direct claim against all the property of the company just as much as if there were wages owing to the servants of the company, or as if there were goods supplied to the use of the company, and they would have a prior claim upon the moveable and transferable property of the company, and property which could be swept off, or attached by the sheriff as against the debenture bonds.

246. They would have a prior claim to the debenture-holders?
I think so, distinctly. It is my opinion, if I were the holder of an acknowledgment of debt of that kind, I should have a claim against the whole of the property of the company, in preference to any debenture claim.

247. Duke of *Devonshire.*] Do not companies generally pay a higher rate of interest upon those certificates than they do upon the regular debentures?
They do. If you give companies larger debenture powers and make their borrowing powers as nearly uniform as possible, it would then be easy to borrow at lower rates.

248. Does not the higher rate of interest which they have to pay show that the holders do not consider them to be quite as good as a security as the debentures?
I think the parties who take these acknowledgments of debt look less at their legal claim than to the fact that these certificates, or the money obtained upon them, are the means to enable the undertaking to be accomplished. They get a high rate of interest upon them, and they will be paid one day or other. Therefore, they are inclined to run the risk.

249. Earl *Powis.*] In defining the position of the shareholder, you said that a shareholder might find his shares made valueless by Lloyd's Bonds, or by preference shares; can preference shares be created without Parliamentary authority, and consequently without the shareholder having an opportunity of voting at the Wharncliffe meeting upon the question of whether those shares shall be created or not?
That is so; preference claims cannot be created without proper resolutions and in the terms of the Act of Parliament; but we all know by experience if we have got into a bad position we are willing rather to sacrifice something than to lose all; and therefore, parties who are in a bad position naturally give their consent, or at all events do not dissent; but I think every one might be saved from that position if there were larger powers of borrowing in proportion to the value of the property, and if those borrowing powers were registered and known, and all the circumstances under which the money was to be raised, if Parliament

Parliament then made those borrowing powers as far as they could, the only powers, I that nine bad speculations out of 10 would be brought to the ground by such a process.

250. Do I understand your opinion to be that, provided a sufficient system of registration of debentures was adopted, Parliament might allow companies safely to borrow a larger proportion than they can now with reference to their share capital?

Yes; as a matter of principle, I think they should be left to borrow as much as they can get, but as a safeguard to their interests that it should be limited to two-thirds.

251. *Lord Steward.*] You have stated that you think it very desirable that these obligations should be registered; how do you think that could be done?

I think a Government Department, such as the Board of Trade, might very properly open a register in which the whole of the circumstances of the company and its property should be clearly and fully set forth, the quantity of share capital authorised by Parliament, the amount of it that has been placed, the amount that has been paid up per share, and such information generally could be easily obtained and given with regard to the position of the company, that when they sought to exercise the borrowing powers which Parliament has given them, the lenders might at a glance see the actual position of the company, and be able to exercise their judgment upon it.

252. How do you think that the cost of such a register should be defrayed?

Clearly by some kind of taxation upon the amount of bonds issued, or the proposal to issue them.

253. Do you think that all the acknowledgments of every company throughout the United Kingdom should be registered in the same office?

I do. I think they should be all registered in the same office. I think the advantage which the Railway Companies themselves would obtain, would consist in the saving of interest which they could effect.

254. Lord *Overstone.*] You contemplate the registry merely as a place of record; you do not contemplate the Board of Trade exercising any absolute control over the amount of bonds which the companies may issue, but simply as an office to record the information which may be accessible to any contemplating lender, and he, upon that information, to exercise his own judgment as to whether he will lend the money?

Yes, I think that will be the proper course to take.

255. So that there would be no positive prevention of the Railway Companies issuing bonds in excess of their powers; it would be merely a record of such information as could be likely to diminish that process?

Just so.

256. Earl of *Airlie.*] Would you require registration in order to give validity to the bonds?

I would.

257. You would give no claim to the holders of bonds which are not registered?

Distinctly; I would shut out the unregistered bonds as far as possible.

258. Lord *Overstone.*] Does your system of registration go to the extent of marking such bonds as have been registered; my impression was that you contemplated a register in which the facts as to the pecuniary status of the company should be clearly set forth; but that that being done, the company should be under no positive restriction, except that which the discretion of any proposed lender would impose upon them?

No, I would go a little further; I should say that the circumstances being set forth, Parliament having limited the borrowing power to be exercised to the extent of two-thirds, then it should be obligatory on the Board of Trade, or the person who administered the department, to mark the bonds in some way or other.

Hon. W. Napier.

16 June 1864.

259. Do you think that there should be an official stamp?

Yes, to show that the bond had passed through the ordeal, and then that bond should be entitled to all the benefits attaching to its position. If possible, I would confiscate every other acknowledgment of debt that the company had made, or at all events postpone its claim to the claims of the registered debentures. I think the result of that might be with regard to the great Railway Companies that they would reduce their interest by something like one per cent. in the course of time.

260. Have you considered how that would work mechanically in detail having regard to the immense number of companies, many of them having no direct communication or access with London?

I think practically they all have access to London through their agents; there are none of them who have not solicitors in London. If they are affiliated companies, the parent companies have their solicitors and agents here, and I think, practically, a difficulty of that kind, although it might be great at first, would resolve itself in the great advantages which such a system would give.

261. Then your system is simply this, that every company shall satisfy the Board of Trade as to the amount which they are entitled to borrow, and that the Board of Trade should give them stamped debentures for that amount which they may put into the market?

That is so.

262. And debentures beyond that would be documents of which the law would take no cognizance?

Just so.

263. Earl of *Airlie.*] There is in Edinburgh a Register for the registration of all mortgages on heritable security?

Yes, called the Record Office.

264. Why should there not be an office analogous to that in Edinburgh, London, and Dublin; would it not be more convenient for all the companies to have such an office as that rather than an office attached to a Department of the Board of Trade?

I think it would be to the interest of the public, first, that there should be no opportunities for evading the law, which there might be by having separate registers, and, next, I think it is to their interest to come to the central point, where these securities are negotiated. There is no real market for these kinds of securities in Edinburgh, Dublin, or the provincial towns. It is only a limited market in those places. It is to London they must come for placing their bonds, and I think there would be no practical difficulty in these days of telegraphs and railways in sending up all these securities and transmitting them again in safety.

265. If the office were attached to the Board of Trade, is there not some risk that the public might imagine that the Government was in some degree responsible for the securities of these companies?

I think not. I think if it is clearly set forth that there is merely a compulsion on the company to state the grounds upon which they are about to raise their debentures to the extent allowed, that the public would not for a moment believe they were absolved from exercising that prudence and discretion which every man is bound to exercise.

266. Lord *Overstone.*] Would it not have much the same effect as the stamps have which are now put upon country bankers' notes?

I think so.

267. *Lord Steward.*] Would you enforce the registration of all existing obligations?

I think if it is to be done at all, that all the companies must be brought to book, and everything registered and re-issued afresh.

268. If it appeared that in some cases the companies had considerably exceeded their Parliamentary borrowing powers, how would you deal with the acknowledgments of such companies?

That

That may be very well left to the parties who issue those debentures to settle with the parties who take them.

269. Would the Registrar be at liberty to affix a Government stamp to those acknowledgments which were in excess of the powers of the company?

I think that by means of a notice being given to all, that these debentures were called in, and that no fresh debentures would be issued until a certain date, it would be easily possible to ascertain whether the company had or had not exceeded its powers of issue, and if they had exceeded them, then I think they should be compelled to re-adjust their affairs before they obtained the advantage of registration.

270. In what manner could they be compelled to re-adjust their affairs?

That is to say, supposing it was advertised, that three months hence this issue of debentures, registered and stamped, would be made there by the end of that time, the Board of Trade would see the whole amount of the debentures that were issued, and if it were in excess of the legitimate issue, I would not give them any registered debentures at all until they had made their affairs straight; then they would be obliged to put their affairs in order.

271. Would there be no hardship in that upon the holders of existing debentures?

I am afraid that hardship will always occur, more or less, in all circumstances of life; I think they might be prepared to run the risk of that.

272. Earl of *Airlie.*] Would you not obtain that result without any hardship upon the existing debenture holders, by requiring that all the fresh debentures when issued should be registered, because these debentures have generally from five to seven years to run; if you required that every fresh debenture that was issued should be registered in time, would you not register the whole of the debentures?

The amount that is represented by these debentures is enormous; it would be many years before they came in, and there would then be two classes of debentures afloat, the registered and unregistered; I think that if such a step is to be taken at all it is better to set about it boldly, and that Companies should be compelled to adopt it at once.

273. *Chairman.*] Would you make it imperative upon the Government officer whose duty it would be to affix these stamps, to satisfy himself that the Companies have not exceeded their statutory borrowing powers before stamping any debentures that are presented to him?

It would be certainly his duty to satisfy himself that they had not exceeded their borrowing powers, and he would not issue or stamp the debentures until he was satisfied of that.

274. Duke of *Devonshire.*] Do you think it would be fair to the holders of existing debentures that the companies to whom they have lent their money should be authorised suddenly to double the amount of their debentures?

I think the public would be so satisfied with the greater security which would be given to their property by such a system of registration, they would willingly consent, as it were, to what I believe would be an imaginary sacrifice, by the creation of a larger amount of debenture debt.

275. Lord *Overstone.*] In point of fact, the companies have now, through the means of Lloyd's Bonds, the power of borrowing indefinitely, have they not?

That is so; they would, therefore, be very great gainers by such a proposal.

276. Duke of *Devonshire.*] We have heard from the last witness, that a great number of the large companies, for instance the North Western and Great Western, do not avail themselves of these Lloyd's Bonds; but, in the case of some other companies, debenture holders might suddenly find the amount of their debentures doubled, and the company would avail themselves of that means to make any additional works rather than apply to Parliament for additional capital?

I think, as their own property would stand at a much better market value when registered, they would willingly consent to such a step, when properly explained to them. I do not believe that it would be a sacrifice in reality.

Hon. W. Napier.

16 June 1864.

277. Earl of *Airlie.*] Would not the power given to them to raise additional debentures give them the means of undertaking fresh works without coming to Parliament for power?

That is a subject, of course, for consideration; it should have the careful consideration of Parliament before they give the power.

278. *Chairman.*] Have you any other observations that you wish to add?

I wish simply to say, as I stated in the commencement, I have no professional experience which entitles me to offer any authoritative opinion upon this subject, and the opinion which I have expressed is the simple opinion which I have formed as a private individual in the course of transactions which, over some years, have passed before me.

Adjourned *sine die.*

APPENDIX.

Appendix A.

EVIDENCE of *Richard Stephens*, Esq., before the Select Committee on the Tewkesbury and Malvern Railway Bill, 20 June 1864.

Richard Stephens, Esq., sworn; Examined by Mr. *Johnson*.

I BELIEVE you are Secretary to the Tewkesbury and Malvern Railway Company?—Yes.

I believe the original capital which was authorised under the Act of 1860 was, as has been stated, 145,000 *l.*?—In shares.

And in loans, 48,000 *l.*; that is so, is it not?—Yes.

And under the Act of 1862, in shares 120,000 *l.*, and loan 40,000 *l.*?—Yes, by the Act of 1860, by shares and loan 193,000 *l.*, and by the Act of 1862, share and loans 160,000 *l.*, together, 353,000 *l.*

Will you tell me of the amount so authorised, what has been expended for the purposes of the undertaking?—Up to 31st December there were 382,000 *l.* expended.

And since that date 50,000 *l.*?—Yes.

Can you tell me whether, to make good deficiencies, the sum of 80,000 *l.* as sought by this Bill, will be required?—I can.

Would that be the case?—Yes.

That is to make good present deficiencies?—Yes, quite so.

Has that been given in the nature of Lloyd's bonds; have the shares been given to the contractor for the execution of the works, and is there a further sum due in respect of securities, in the nature of Lloyd's bonds?—Yes; the shares and bonds were given to the contractor in the first instance, being the only things the Company had to give in payment for works, and for land, and for general expenses, and so on, of the Company.

When you are speaking of bonds, do you mean the usual mortgage for money borrowed under the authority of the Act?—The debenture bonds are under the Act, certainly,

Can you tell me this, you say that the further sum of 80,000 *l.* would be required of share capital. You know you take under this Bill power to borrow 26,000 *l.* more as a proportionate amount to the capital now sought, under the borrowing powers?—Yes.

Are these liabilities of the company beyond the 80,000 *l.* that you have now said is necessary to meet the present deficiencies?—Yes.

What do they amount to?—I should think, in round numbers, between 25,000 *l.* and 30,000 *l.*

Will the borrowing powers, with the additional capital sought under this present Bill, as nearly as you can ascertain the present liabilities and deficiencies of the company, absorb the whole amount sought, and at the same time provide an adequate amount for the payment of all expenses?—I believe it would meet all the requirements, and meet all the expenses.

And be no more than is required?—No more; I think it will just about fit, one with the other.

Cross-examined by Mr. *Davison*.

I do not see what you have got to pay for our land with, if you have only got from 25,000 *l.* to 30,000 *l.*?—That is an estimate of the liabilities.

You have got 80,000 *l.* in your Bill, and you have power to borrow 26,000 *l.*?—Yes.

What have you got to pay us for our land, if you get power to take it?—I think I have already answered that question.

Is it in the liabilities?—Yes.

We are to be paid out of the liabilities; the Lloyd's bonds?—Yes; in that 30,000 *l.* of liabilities the land is included.

It is future liability?—Yes.

What did you mean by saying that your liabilities in addition to 80,000 *l.*, were from 25,000 *l.* to 30,000 *l.*?—I did say so.

What was that for?—Partly for land, partly for extra works, and partly for general expenses.

Do you mean works done?—Works done, and to be done.

Appendix A.

Land bought?—Land to be bought, and general expenses to be paid for, as they arise.

How much for land?—I cannot tell you.

How much for works done?—Perhaps the engineer will tell you that.

How much for works done; I am not asking for works to be done?—I cannot answer that question.

How many miles of railway have you?—Between 11 and 12; 11 miles and some chains, I believe it is.

By the *Committee.*] Does the sum of from 20,000 *l.* to 30,000 *l.* which you speak of, include your contemplated expenses for the purchase of land and building your proposed new station?—Yes; all of it.

Re-examined by Mr. *Johnson.*

And making a bridge in lieu of a level crossing?—Yes; it was discussed by the directors and the engineer, and that was thought sufficient.

When you speak of liabilities, you mean present liabilities, as well as contemplated liabilities, under this Bill?—Yes, precisely.

Can you say what the deficiencies are for which further capital is required; what the prospective expenditure is for which you also require funds?—I mean the expected expenditure, the non-ascertained liabilities.

By the *Committee.*] There is a statement in this preamble, that the whole sum which the company are authorised to raise by shares has been subscribed for, and 235,000 thereof have been paid up; how has that been done?—That has been done through the contractor; the company having no money paid the contractor in bonds and shares of the company, instead of money.

Do you mean that you issued the shares of the company through the contractor?—Yes.

Did you simultaneously issue to him bonds?—Yes, simultaneously, he was obliged to have a certain number of shares issued to him.

I am speaking of "Lloyd's Bonds," not of your debenture bonds, but of your authorised bonds?—The company issued no Lloyd's bonds till their share capital was nearly exhausted.

All their shares were issued to the contractor?—The greater portion.

Will you just describe how the shares were issued to the contractor?—They were issued to the contractor according to their original value of 10 *l.* each; but the contractor in consequence of being paid in shares, and not in money, required a larger price for his work; so that in effect, it was reducing the value of the shares.

Were the shares issued to the contractor according as he did work to the value of them?—Upon the engineer's certificate.

Upon what occasion were the Lloyd's bonds issued?—The company having no other means of paying the contractor, and being in his debt, had to resort to the only method of payment that they could devise.

That was by the issue of Lloyd's bonds?—Yes.

Had he not been already paid for his work in shares?—No.

What did he get the shares for?—The line originally was intended to be a single line.

This is a very important question. I want to get at the system of issuing Lloyd's bonds, because it appears to me now, that he has got shares and bonds for the same work?—No; for extra work. Stations were enlarged, and sidings, and various other works done.

It would be very satisfactory if you could give us anything like an account of how the shares and bonds were issued to him. When did you begin to issue the shares and bonds to him?—The office books and vonchers would show that; I have not the books with me.

Do you mean to tell us this, that first shares were issued to the contractor for work done; in fact, the whole of the shares must have been issued to him because they must have been all subscribed for?—Quite so.

And he gave value for those shares?—Yes; according to the engineer's certificates.

According as they were issued to him; then after that, did you commence exercising your borrowing powers towards him?—Yes.

You gave him your debenture bonds?—Yes.

And when those were exhausted you took to Lloyd's bonds?—Yes.

Has any money actually been paid up upon the shares by anybody?—No.

It appears that there are 30,000 *l.* of shares yet unissued; has the contractor refused to take those bonds?—He did not refuse to take them, but he could do nothing with them; the shares were not negotiable; he said, "If you hamper me with shares, I can do no more." They were not negotiable.

At what amount were the 10 *l.* shares taken by the contractor?—The company had no power to deteriorate the value of the shares; they were taken at 10 *l.*

I mean by the *hocus pocus*, what were they worth?—I suppose they were worth 5 *l.* each.

How much work did he give for them?—He made the line.

But how much proportionate work did he give; how much real work was given for them?—I suppose for every 10 *l.*, 5 *l.*

As certified by the engineer?—Yes; and if you took them into the market you would not get 5 *l.* for them; now you would not get more than 3 *l.*

Are those Lloyd's bonds still out?—Yes.

Are they bearing interest?—Five per cent.

And

And they have coupons annexed to them, just as if they were issued under Parliamentary powers?—Yes.

Who is to pay all the expenses that are going on in this room?—The Company will have to pay them.

Where is the money to come from?—We are seeking for authority to do that now.

Do I understand that this is strictly what you call an independent line, or one brought out under the auspices of the Midland?—It is perfectly independent; we rather pride ourselves upon our independence.

Who holds these shares?—There is a good share list.

Have you an agreement with the Midland to work you?—There is a working agreement at 5 per cent. of the receipts authorised by and confirmed by Parliament; we have a very good share list now; I can produce it.

Has anybody paid up any money?—They buy the shares from the contractor and then they become shareholders.

Will those parties have a chance of having the preference shares?—Of course they would.

Are they to have the preference stock?—It is a matter for the directors; I should say they would; it is the usual arrangement to give the shareholders the preference stock if they choose.

Have you got the share list here?—It is at the office.

You state that no money has been paid up upon the shares?—The contractor sells the shares and the person who buys the shares becomes the proprietor.

Are those persons who hold the shares which they bought under the contractor, to have the option of the preference stock?—I believe so, it is the usual course to do so.

Then the contractor is not to have all the preference stock?—No, the contractor holds very few shares now.

Brought from the Lords, 21 *July* 1864.

REPORT

FROM THE

SELECT COMMITTEE OF THE HOUSE OF LORDS

ON

RAILWAY COMPANIES' BORROWING POWERS;

TOGETHER WITH THE

PROCEEDINGS OF THE COMMITTEE,

MINUTES OF EVIDENCE,

AND APPENDIX.

Ordered, by The House of Commons, *to be Printed*, 22 *July* 1864.

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REPORT

FROM THE

SELECT COMMITTEE

ON

RAILWAY COMPANIES' POWERS;

TOGETHER WITH THE

PROCEEDINGS OF THE COMMITTEE,

MINUTES OF EVIDENCE,

APPENDIX, AND INDEX.

REFORM CLUB PALL MALL

Ordered, by The House of Commons, *to be Printed,*
18 *March* 1864.

Lunæ, 8° *die Februarii*, 1864.

Ordered, That a Select Committee be appointed to inquire and report whether it is expedient that Railway Companies shall be authorised, and, if so, upon what Conditions, to construct or enlarge, purchase or take on Lease, or otherwise appropriate, any Dock, Pier, Harbour, or Ferry; or to acquire, provide, and use any Steam Vessels for the conveyance of Goods and Passengers, or to apply any portion of their Capital or Revenue to other objects distinct from the undertaking of a Railway Company.

Jovis, 3° *die Martii*, 1864.

Committee nominated of—

Mr. Hutt.	Mr. Adair.
Lord Stanley.	Sir James Fergusson.
Mr. Algernon Egerton.	Mr. Lygon.
Mr. Richard Hodgson.	Mr. Kinnaird.
Mr. Clay.	Mr. Pollard-Urquhart.
Sir Francis Goldsmid.	Mr. Massey.

Ordered, That the Committee have power to send for Persons, Papers, and Records.

Ordered, That Five be the Quorum of the Committee.

Lunæ, 14° *die Martii*, 1864.

Ordered, That the Petition from Hull Chamber of Commerce, against granting Powers to Railway Companies to run Steamboats, be referred to the Committee.

Martis, 15° *die Martii*, 1864.

Ordered, That the Petitions against granting Powers to Railway Companies to run Steamboats, from the Lord Provost and Magistrates of Glasgow, and Dundee Chamber of Commerce, be referred to the Committee.

Veneris, 18° *die Martii*, 1864.

Ordered, That the Committee have power to Report their Observations, together with the Minutes of Evidence taken before them, to The House.

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REPORT.

THE SELECT COMMITTEE appointed to inquire and report whether it is expedient that RAILWAY COMPANIES shall be authorised, and, if so, upon what Conditions to construct or enlarge, purchase or take on Lease, or otherwise appropriate any DOCK, PIER, HARBOUR, or FERRY, or to acquire, provide, and use any STEAM VESSELS, for the Conveyance of GOODS and PASSENGERS, or to apply any portion of their CAPITAL or REVENUE to other objects distinct from the Undertaking of a RAILWAY COMPANY;—— HAVE considered the Matters to them referred, and have agreed to the following REPORT:

By the 142d Standing Order of the House, Railway Companies are not permitted to obtain powers for the owning or using of steamboats for purposes of river or seagoing traffic, except on a special recommendation by the Committee, to which is referred the consideration of the Bill in which such powers are proposed to be taken.

From the above Standing Order, it would appear that a *primâ facie* objection is considered by Parliament to exist to the possession of these powers by Railway Companies, although this objection may be overruled at the discretion of a Committee, on special reasons being assigned. The question which your Committee have had to deal with, is whether such *primâ facie* objection is justified on any valid grounds of public policy.

It is evident, as indicated in the Report from the Board of Trade, dated February 1863, that one of the reasons which originally led to the imposing of the restriction in question now no longer exists. Until within the last few years, Companies incorporated under the principle of limited liability were the exception, and not the rule. Railway Companies invariably enjoyed this advantage; Steamboat Companies, generally speaking, had it not. Hence the two, if brought into competition, competed on terms which Parliamentary legislation had rendered unequal; and, under these circumstances, the demand of the shipowning interest that Railway Companies should be restricted to that business for which alone their exceptional privileges had been granted, was both natural and just. This plea is swept away by the extension to all commercial undertakings alike of the principle of limited liability.

Your Committee can attach no importance to another argument frequently urged upon them, that Railway Companies ought not to be allowed to compete for sea-traffic, because, by their greater command of capital, it will be (as is alleged) in their power to establish a virtual monopoly. The advantage of a large over a small capital in business is undoubted, but it is legitimate; it forms no fit subject for Parliamentary interference; nor is it easy to see, if interference on such grounds be sanctioned in the case of one class of undertakings, why it should not equally be extended to all; but this principle could only be acted upon by a compulsory limitation of the amount of capital to be employed by any one firm or company in any one business—a measure alike impracticable and unjust. Nor can any reason be assigned for excluding Railway Companies from the use of steamers, on the score of their superior wealth, that might not equally be appealed to for the protection of individual ship-owners or small firms, against the competition of more powerful rivals in their own line.

It is contended, with more show of justice, that Railway Companies enjoying something like a monopoly of land traffic in those districts through which their

lines extend, are not entitled to use for other purposes the advantage which that monopoly gives them; but to this it may be answered, first, that in the present day, the monopoly thus spoken of is more apparent than real; few important towns are on a single line of rail; almost every district where the amount of trade is not utterly insignificant, is now, or soon will be, open to the competition of rival Companies; and next, that even were it otherwise, the exclusive rights enjoyed by Railway Companies on land, if regulated in such manner as is suggested by your Committee, will give them no other powers over sea-traffic than such as are due to their command of capital, an advantage not peculiar to them, and in which they may be rivalled by Companies formed exclusively for purposes of navigation. It may also be observed, that the exceptional privileges granted to Railway Companies at their first formation are balanced by equally exceptional restrictions. The imposition of a maximum rate of charge for goods and passengers would be an interference with traffic arrangements not to be justified, but for the necessity under which Railway Companies lie, of obtaining from Parliament powers of compulsory purchase. The exceptional interference may fairly be set off against the exceptional privilege.

Your Committee have heard it asserted, that the advantages admitted to arise out of unity of management, such as through-booking, exact adjustment of times of departure of steamers in connexion with railways, absence of petty charges, and the like, may be equally well secured by arrangement between independent Packet Companies and Railways. They do not dispute this assertion; but they consider that the power of securing such accommodation to the public under a system of divided management affords no reason why the simpler system of a single control should not be adopted, if it be shown to the satisfaction of a Committee, that the general convenience will be as well served by the latter course. The burden of proof lies on those who would forbid an arrangement not in itself contrary to public policy; those who support it may be content with showing that no case of public injury has been made out against them.

It has been argued that Railway Companies, in order to secure a permanent monopoly of lucrative sea-traffic, will continue, if necessary, even for years, to run steamers at a loss, hoping to make good by ultimate larger returns, the sacrifice thus voluntarily incurred.

Your Committee observe on this, that even if such a course be adopted, it is no more than may be done, and probably is done, by competing interests in all branches of trade, and that the inconvenience and loss caused thereby to individuals is a necessary incident of unrestricted competition. The public may be guarded, by the imposition of maximum fares, as in the case of land traffic, against exorbitant charges; and the shareholders must be trusted to control their directors in any attempt wastefully to expend the funds at their disposal.

It is equally in the power of Private Bill Committees to guard, by stringent regulations, against any attempt on the part of Railway Companies to exclude from their vessels, or from docks or harbours, owned by them, traffic brought otherwise than along their line, or unduly to favour their own traffic; and it is the opinion of Your Committee that such regulations ought to be framed in each case, and that the Board of Trade should, in its Reports, point out to the House the necessity of guarding carefully against such abuses.

On the whole, your Committee are unable to see why companies owning railways should not own steamers also, if it be expedient for the development of their traffic; why to the business of carrying by land, they should not add that of carrying by sea. They accordingly recommend the repeal of so much of the 142d Standing Order as applies to Docks, Piers, Harbours, Ferries, and Steam Vessels, and the substitution of one to the following effect:—

> "No. 142. In every Bill by which a Railway Company shall be authorised to construct or enlarge, purchase or take on lease, or otherwise appropriate any dock, pier, harbour or ferry, or to acquire and use any steam vessels for the conveyance of goods or passengers, provision for preventing unreasonable charges, and for securing equality of treatment and the due transmission of traffic, shall be made in such manner as shall appear to the Committee on the Bill adapted to the circumstances of the case."

They

They think, however, as an application of the funds of a Railway Company to the purchase or hire of Steam-ships cannot be held to have been contemplated by the first promoters, or by those who have invested their capital in the undertaking, that with respect to every Bill authorising a Railway Company to acquire or use any Steam-vessel, the provisions of the Standing Orders 66 and 67, so far as they are applicable to such additional undertaking, ought to be observed.

The same arguments which apply to the case of Steam-vessels, appear to your Committee to bear also on that of docks, piers, harbours, and ferries. The case of collieries, mines, and other enterprises distinct from the business of carrying passengers and goods, stands on a separate footing; and on these latter questions no evidence has been laid before them.

18 March 1864.

PROCEEDINGS OF THE COMMITTEE.

Lunæ, 7° die Martii, 1864.

MEMBERS PRESENT:

Mr. Massey.	Mr. Kinnaird.
Lord Stanley.	Mr. Adair.
Mr. Clay.	Mr. Algernon Egerton.
Mr. Pollard-Urquhart.	

Lord STANLEY was called to the Chair.

The Committee deliberated on the course of proceeding.

[Adjourned to Wednesday, at Twelve o'clock.

Mercurii, 9° *die Martii,* 1864.

MEMBERS PRESENT.

Lord STANLEY in the Chair.

Mr. Richard Hodgson.	Sir Francis Goldsmid.
Mr. Hutt.	Mr. Adair.
Mr. Clay.	Mr. Algernon Egerton.
Mr. Pollard-Urquhart.	Mr. Lygon.
Mr. Kinnaird.	Mr. Massey.

Mr. *William Conway Morgan,* Mr. *John Lumsden,* Mr. *Henry John Atkinson,* Mr. *William Ferrier Kerr,* Mr. *Anthony George Robinson,* and Mr. *Frederick Somes,* were severally examined.

[Adjourned till To-morrow, at Twelve o'clock.

Jovis, 10° *die Martii,* 1864.

MEMBERS PRESENT:

Lord STANLEY in the Chair.

Mr. Richard Hodgson.	Sir Francis Goldsmid.
Mr. Massey.	Mr. Adair.
Mr. Algernon Egerton.	Mr. Clay.
Sir James Fergusson.	Mr. Pollard-Urquhart.
Mr. Hutt.	Mr. Kinnaird.
Mr. Lygon.	

Mr. *George Burns,* Mr. *William Watson,* Mr. *W. C. Morgan,* Mr. *J. S. Forbes,* and Mr. *Robert Moseley,* were severally examined.

[Adjourned till To-morrow, at Twelve o'clock.

Veneris, 11° *die Martii*, 1864.

MEMBERS PRESENT:

Lord STANLEY in the Chair.

Mr. Richard Hodgson.	Sir Francis Goldsmid.
Mr. Massey.	Mr. Clay.
Mr. Hutt.	Mr. Algernon Egerton.
Sir James Fergusson.	Mr. Lygon.
Mr. Kinnaird.	

Mr. *W. C. Morgan*, Mr. *J. Allport*, Mr. *C. W. Eborall*, Mr. *James C. Burns*, and Mr. *James Booth*, were severally examined.

[Adjourned to Wednesday, at Twelve o'clock.

Mercurii, 16° *die Martii*, 1864.

MEMBERS PRESENT:

Lord STANLEY in the Chair.

Mr. Algernon Egerton.	Mr. Richard Hodgson.
Mr. Pollard-Urquhart.	Sir Francis Goldsmid.
Mr. Massey.	Mr. Kinnaird.
Mr. Clay.	Sir James Fergusson.
Mr. Lygon.	Mr. Hutt.

Motion made, and Question proposed,—" That it is the opinion of this Committee, that Standing Order No. 142 should be repealed, and the following Order substituted for it:

" No. 142. In every Bill by which a Railway Company shall be authorised to construct or enlarge, purchase or take on lease, or otherwise appropriate any Dock, Pier, Harbour, or Ferry, or to acquire and use any Steam Vessels for the conveyance of Goods or Passengers, provision for preventing unreasonable charges, and for securing equality of treatment, and the due transmission of traffic, shall be imade in such manner as shall appear to the Committee on the Bill adapted to the circumstances of the case "—(*Mr. Hodgson*).

Question put.—The Committee divided:

Ayes, 6.	Noes, 4.
Mr. Hutt.	Mr. Egerton.
Mr. Richard Hodgson.	Mr. Clay.
Mr. Lygon.	Sir Francis Goldsmid.
Mr. Kinnaird.	Sir James Fergusson.
Mr. Pollard-Urquhart.	
Mr. Massey.	

Resolved,—That it is the opinion of this Committee, that Standing Order No. 142 should be repealed, and the following Order substituted for it:

No. 142. In every Bill by which a Railway Company shall be authorised to construct or enlarge, purchase or take on lease, or otherwise appropriate any Dock, Pier, Harbour, or Ferry, or to acquire and use any Steam Vessels for the conveyance of Goods or Passengers, provision for preventing unreasonable charges, and for securing equality of treatment, and the due transmission of traffic, shall be made in such manner as shall appear to the Committee on the Bill adapted to the circumstances of the case.

[Adjourned to Friday, at Half-past Two o'clock.

Veneris, 18° *die Martii*, 1864.

MEMBERS PRESENT:

Lord STANLEY, in the Chair.

Mr. Richard Hodgson.	Mr. Kinnaird.
Mr. Clay.	Sir Francis Goldsmid.
Mr. Massey.	Mr. Lygon.
Mr. Algernon Egerton.	Mr. Hutt.

Report proposed by the Chairman, read 1° as follows:—

"1. By the 142d Standing Order of the House, Railway Companies are not permitted to obtain powers for the owning or using of steamboats for purposes of river or seagoing traffic, except on a special recommendation by the Committee, to which is referred the consideration of the Bill in which such powers are proposed to be taken.

"2. From the above Standing Order, it would appear that a *primâ facie* objection is considered by Parliament to exist to the possession of these powers by Railway Companies, although this objection may be overruled at the discretion of a Committee, on special reasons being assigned. The question which your Committee have had to deal with, is whether such *primâ facie* objection is justified on any valid grounds of public policy.

"3. It is evident, as indicated in the Report from the Board of Trade, dated February 1863, that one of the principal reasons which originally led to the imposing of the restriction in question now no longer exists. Until within the last few years, Companies incorporated under the principle of limited liability were the exception, and not the rule. Railway Companies invariably enjoyed this advantage; Steamboat Companies, generally speaking, had it not. Hence the two, if brought into competition, competed on terms which Parliamentary legislation had rendered unequal; and, under these circumstances, the demand of the shipowning interest that Railway Companies should be restricted to that business for which alone their exceptional privileges had been granted, was both natural and just. This plea is swept away by the extension to all commercial undertakings alike of the principle of limited liability.

"4. Your Committee can attach no importance to another argument frequently urged upon them, that Railway Companies ought not to be allowed to compete for sea-traffic, because, by their greater command of capital, it will be (as is alleged) in their power to establish a virtual monopoly. The advantage of a large over a small capital in business is admitted, but it is legitimate; it forms no fit subject for Parliamentary interference; nor is it easy to see, if interference on such grounds be sanctioned in the case of one class of undertakings, why it should not equally be extended to all; but this principle could only be acted upon by a compulsory limitation of the amount of capital to be employed by any one firm or company in any one business—a measure alike impracticable and unjust. Nor can any reason be assigned for excluding Railway Companies from the use of steamers, on the score of their superior wealth, that might not equally be appealed to for the protection of individual shipowners or small firms, against the competition of more powerful rivals in their own line.

"5. It is contended, with more show of reason, that Railway Companies enjoying something like a monopoly of land traffic in those districts through which their lines extend, are not entitled to use for other purposes the advantage which that monopoly gives them; but to this it may be answered, first, that in the present day, the monopoly thus spoken of is more apparent than real; few important towns are on a single line of rail; almost every district where the amount of trade is not utterly insignificant, is now, or soon will be, open to the competition of rival Companies; and next, that even were it otherwise, the exclusive rights enjoyed by Railway Companies on land, give them no other powers over sea-traffic than such as are due to their command of capital, an advantage not peculiar to them, and in which they may be rivalled by Companies formed exclusively for purposes of navigation. It may also be observed, that the exceptional privileges granted to Railway Companies at their first formation are balanced by equally exceptional restrictions. The imposition of a maximum rate of charge for goods and passengers would be an interference with traffic arrangements not to be justified, but for the necessity under which the Companies lay, of obtaining from Parliament powers of compulsory purchase. The exceptional interference may fairly be set off against the exceptional privilege.

"6. Your Committee have heard it asserted, that the advantages admitted to arise out of unity of management, such as through-booking, exact adjustment of times of departure of steamers in connexion with Railways, absence of petty charges, and the like, may be equally well secured by arrangement between independent Packet Companies and Railways. They do not dispute this assertion; but they consider that the power of securing such accommodation to the public, under a system of divided arrangement, affords no reason why the simpler system of a single control should not be adopted, if it be shown to the satisfaction of a Committee, that the general convenience will be as well served by the latter course.

The

The burden of proof lies on those who would forbid an arrangement not in itself contrary to public feeling; those who support it may be content with proving that no case of public injury has been made out against them.

"7. It has been argued that Railway Companies, in order to secure a permanent monopoly of lucrative sea-traffic, will continue, if necessary, even for years, to run steamers at a loss, hoping to make good, by ultimate larger returns, the sacrifice thus voluntarily incurred.

"Your Committee observe on this, that even if such a course be adopted, it is no more than may be done, and probably is done, by competing companies in all branches of trade, and that the inconvenience and loss caused thereby to individuals, is a necessary incident of unrestricted competition. The public may be guarded, by the imposition of maximum fares, as in the case of land traffic, against exorbitant charges; and the shareholders must be trusted to control their directors in any attempt wastefully to expend the funds at their disposal.

"8. It is equally in the power of Private Bill Committees to guard, by stringent regulations, against any attempt, on the part of Railway Companies, to exclude from their vessels, or from docks or harbours, owned by them, traffic brought otherwise than along their line, or unduly to favour their own traffic; and it is the opinion of your Committee that such regulations ought to be framed in each case, and that the Board of Trade should, in its Reports, point out to the House the necessity of guarding carefully against such abuses.

"9. On the whole, your Committee are unable to see why companies owning Railways should not own steamers also, if it be expedient for the development of their traffic; why to the business of carrying by land, they should not add that of carrying by sea. They accordingly recommend the repeal of the 142d Standing Order, and the substitution of one to the following effect:—

> "'No. 142. In every Bill by which a Railway Company shall be authorised to construct or enlarge, purchase or take on lease, or otherwise appropriate any dock, pier, harbour or ferry, or to acquire and use any steam vessels for the conveyance of goods or passengers, provision for preventing unreasonable charges, and for securing equality of treatment, and the due transmission of traffic, shall be made in such manner as shall appear to the Committee on the Bill adapted to the circumstances of the case.'

"10. They think, however, that as an application of the funds of a Railway Company to the purchase or hire of steamships cannot be held to have been contemplated by the first promoters, or by those who have invested their capital in the undertaking, shareholders dissenting from the proposed purchase, or lease, or use, should be entitled to a hearing before the Committee to which the Bill is referred.

"11. The same arguments which apply to the case of steam vessels, appear to your Committee to bear also on that of docks, piers, harbours, and ferries. The case of collieries, mines, and other enterprises, distinct from the business of carrying passengers and goods, stands on a separate footing; and on these latter questions, no evidence has been laid before them."

Report proposed by Mr. *Algernon Egerton*, read 1° as follows:—

"The Select Committee appointed to inquire and report whether it is expedient that Railway Companies shall be authorised, and, if so, upon what conditions, to construct or enlarge, purchase or take on lease, or otherwise appropriate, any dock, pier, harbour, or ferry, or to acquire, provide, and use any steam vessels for the conveyance of goods and passengers, or to apply any portion of their capital or revenue to other objects distinct from the undertaking of a Railway Company, have considered the matters to them referred, and have agreed to the following Report:—

"Your Committee have examined persons engaged in steam shipping business, and also others connected with Railway Companies, and have obtained evidence which will be found in the Appendix to this Report.

"It appears from that evidence that since the year 1847 many applications have been made to Parliament by Railway Companies for powers to acquire, provide, and use steam vessels to be employed between ports in this country to which such companies had access and various other ports both in the United Kingdom and on the Continent.

"That the applications for such powers have been, almost without exception, opposed by the private steam ship owners of the most considerable ports of this country. That some of these applications by Railway Companies have been wholly refused by Parliament; an equal number have been withdrawn by the promoters in consequence of opposition; while, in those which have been successful, Parliament has thought fit to restrict the employment of the steam vessels to certain specified ports on either side of the Channel, or at either end of the proposed communication."

"That the private steam ship owners have been put to great expense in defending their interests, by resisting these numerous applications.

"That, with one exception, on all the principal points of approach between Great Britain and Ireland, and the Continent of Europe, by which the passenger and postal communication between the respective countries can be expected to flow, powers have been already granted to railway companies to provide steam vessels. The exception referred to is that between Portpatrick and Donaghadee, which being the shortest sea passage from Scotland to Ireland, and analogous to the passage between Dover and Calais, Folkestone and Boulogne, and Holyhead and Dublin, might, in the opinion of your Committee, be treated as an exceptional case without departing from the general principles which they consider to have been established before them.

"That although limited liability may now be obtained by private parties or companies owning steam vessels, yet that privilege in itself is not sufficient to enable such parties or companies fairly to compete with railway companies, to whom the power of owning steam vessels may be given.

"That the very large capital possessed by railway companies, and the amount of their yearly receipts enables them to sustain a loss upon the steam vessels belonging to them, which, though sufficiently large in most cases to ruin the private traders or companies with whom they might compete, yet as respects themselves is scarcely appreciable.

"That Railway Companies are prepared to submit to such losses for the purpose of securing the traffic along their own lines of Railway.

"That the Railway Companies have a much greater advantage than the foregoing one in their power of directing traffic carried along their railway to their own steam vessels, and by refusing accommodation, by occasioning obstacles, by giving bonuses, or by making the rates on the sea portion of the journey so low as to prevent competition by private steam ship owners or companies, while keeping up the rates on land to the ports, they have power to extinguish the competition alike of steam ship companies and of private ship owners, and to establish a practical monopoly.

"That all the advantages of the system of through-booking and through rates may be and to a great extent already are, afforded by means of arrangements between private steam ship owners and railway companies; and that all that is necessary to secure and extend these advantages is the concession by the railway companies of such arrangements.

"That there is an admitted risk of creating a monopoly, and of inflicting a very serious injury, probably to its entire extinction, to the existing steam shipping interest of ths country, without any very intelligible benefit to the public, and your Committee are of opinion that the further extension of the powers in question is not desirable.

"That while provisions for preventing unreasonable charges and for securing equality of treatment and the due transmission of traffic are in themselves proper, yet they do not afford any protection against the monopoly which your Committee are of opinion may arise by granting to Railway Companies the power to acquire, provide, or use steam vessel s.

"Your Committee are therefore of opinion that no further powers of acquiring, providing, or using steam ships or other vessels, should be given to any railway company, except for the purpose of effecting such crossing of a river or estuary, or such short passage between neighbouring ports, commonly used, or notoriously the most convenient, for a large passenger traffic, as may be fairly considered to come under the definition of ferries.

"That the possession of docks, piers, or harbours by railway companies affords them the means of still further controlling the traffic and increases the objection to granting any such railway company the power of acquiring, providing, or using steam ships or other vessels."

Question, "That the Report proposed by the Chairman be now read 2°, paragraph by paragraph,"—put, and agreed to.

Paragraph 1 to paragraph 7, with verbal amendments, agreed to.

Paragraph 8.—Amendment proposed, after the word "case," to insert the words, "to be carried into effect in cases of dispute under the supervision of the Board of Trade"—(*Mr. Lygon*).—Question put, That those words be there inserted:—The Committee divided:

Ayes, 4.	Noes, 4.
Mr. Lygon.	Mr. Hodgson.
Mr. Clay.	Mr. Hutt.
Sir Francis Goldsmid.	Mr. Massey.
Mr. Algernon Egerton.	Mr. Kinnaird.

The Chairman declared himself with the Noes.

Amendment

Amendment proposed, to leave out all the words from the word "case," to the end of the paragraph—(*Mr. Hodgson*).—Question put, That the words proposed to be left out stand part of the paragraph:—The Committee divided:

Ayes, 5.	Noes, 3.
Mr. Lygon.	Mr. Hodgson.
Mr. Clay.	Mr. Hutt.
Sir Francis Goldsmid.	Mr. Massey.
Mr. Kinnaird.	
Mr. Algernon Egerton.	

Paragraph agreed to.

Paragraphs 9 and 10 amended, and agreed to.

Paragraph 11 agreed to.

Question, "That this Report, as amended, be the Report to The House," put, and agreed to.

Ordered, To report, together with the Minutes of Evidence, and Appendix.

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Mercurii, 9° die Martii, 1864.

MEMBERS PRESENT:

Mr. Adair.	Mr. Kinnaird.
Mr. Clay.	Mr. Lygon.
Mr Algernon Egerton.	Mr. Massey.
Sir Francis Goldsmid.	Lord Stanley.
Mr. Richard Hodgson.	Mr. Pollard Urquhart.
Mr. Hutt.	

THE RIGHT HONOURABLE LORD STANLEY, IN THE CHAIR.

William Conway Morgan, Esq., called in; and Examined.

W. C. Morgan, Esq.

9 March 1864.

1. *Chairman.*] I THINK you are Secretary to the Steam Shipowners' Association of London?—I am.

2. How long has that association been in existence?—For 24 years.

3. And how long have you been secretary to it?—Nearly 19 years.

4. Probably you have watched with some care the question of railway companies becoming owners of steamboats?—I have.

5. Can you tell the Committee at what time that question first came before the public?—The question, as well as I remember, was first mooted in 1846. In that year there was a bill filed by a Mr. Colman, one of the shareholders of the Eastern Counties Company, to restrain the company from employing their funds, which had been raised for the purposes of the railway, in steamboat undertakings, and an injunction was granted by the Master of the Rolls, upon the ground that, though the powers which they sought to exercise might not be contrary to public policy, and though the shareholders, or the majority of them, might assent to it, still the object was an illegitimate one for a railway company to undertake.

6. They had proceeded without any application to Parliament, had they not?—Without any application to Parliament.

7. Sir *Francis Goldsmid.*] Was the suit to restrain the application of funds to the promoting of a Bill?—The application of railway funds to steamboat purposes.

8. Not in promoting a Bill?—No; the Company sought in the following year to set that matter right by applying to Parliament for powers; they did so in 1847.

9. *Chairman.*] That was to obtain powers for steamers to ply between Harwich and continental ports?—Yes, as a railway company.

10. That proposal was opposed, I presume, by the steamship owners?—There was opposition from different quarters, and they withdrew the application.

11. Did they proceed to engage in the business after the abandonment of that Bill without Parliamentary sanction?—There was a trade carried on between Harwich and the continent in boats, I believe, belonging to the company. They tried it for some years, and in 1856, I think it was, they retired from it. They having lost a great deal of money, the chairman recommended the shareholders not to continue it.

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12. I have the statement before me that they then spoke of that outlay as having been an experiment; was that the case?—In one of their printed reports I remember they talked of it as being a mere experiment. The directors recommended giving it up principally upon this ground, that it was, as they said, a thing to be undertaken by an association formed expressly for the purpose. They seem, therefore, to point to the necessity of some large steamboat company undertaking it.

13. Did they say something to this effect, that, in order to work that traffic effectively, it would be necessary to have vessels of larger capacity and power than those which they had employed, and vessels having high rates of speed; and that for that purpose a large capital would be requisite?—I think those were the words.

14. That was the substance at any rate?—Yes.

15. In the same year, 1847, do you recollect an application being made by the Chester and Holyhead Company?—They applied to Parliament in the same Session; and, in the first instance, they obtained the powers. Lord Rendlesham was the Chairman of the Committee; that Committee granted the power without hearing (I may say) the opponents of the Bill; there was no steamboat trade at Holyhead, and there was no evidence given to the Committee on behalf of the opponents of the Bill to the effect that they could supply the trade there: it was an experimental matter altogether on the part of the company.

16. In short, their position was that they applied for permission to create a trade which did not exist?—That was the fact.

17. Nevertheless, they were opposed by the Dublin Company, were they not?—Yes, by our Association in London, and the Dublin Steam Packet Company, and I believe one or two other Companies opposed them. Notwithstanding that opposition, they obtained their powers upon the ground I have stated. But in the same Session, and, indeed, upon the very same day on which that decision was come to, Sir Henry (then Mr.) Ward was sitting as the Chairman of a Committee upon the Holyhead Harbour Bill; that was a public Committee, consisting of 15 members. When it was stated to them by counsel, on our behalf, that the Committee in the next room had granted to the company the power of establishing steamboats, they came to the decision that under no circumstances, directly or indirectly, did they think that the Chester and Holyhead Company should obtain that power. I believe the reason was that they thought that if the company obtained steamboat powers in connexion with the advantages in the harbour which they proposed to obtain, it would lead to monopoly, and shut out independent owners.

18. Did they give any reason for that decision?—Nothing more than they thought that it would not tend to the public advantage for the company to have those immense powers.

19. Mr. *Hodgson.*] In what year was that?—In 1847.

20. *Chairman.*] I think that when these powers which you have been speaking of were granted by the Committee, there was some condition added that they should not be used except with the sanction of the Board of Trade?—That was the case.

21. Therefore, in point of fact, that Committee did not absolutely grant those powers; it rather granted authority to the Board of Trade to give them?—Quite so.

22. In consequence of that expression of opinion by the Committee over which Mr. Ward presided, did the Company abandon their powers?—They did.

23. In the next year do you recollect any other applications being made for similar powers?—In the next year the Chester and Holyhead Company repeated their application; and the London and South Western, the London, Brighton, and South Coast, and the Furness Companies also applied for steamboat powers; and—I suppose in consequence of the concession of the power to the Chester and Holyhead Company in the previous year—there was a Report from the Board of Trade upon those four projects. That Report recommended, with certain conditions, the concession of the powers.

24. One of those Bills was lost, was it not?—The London, Brighton, and South Coast Company lost their Bill.

25. The others obtained power to provide steamboats, with certain limitations?—

tions?—With certain limitations; the Chester and Holyhead Company applied for powers to own other vessels besides steam-vessels, and they were deprived of the power.

26. Do you recollect the limitations which were imposed?—They were mainly as to rates and time; the number of years was limited to 14 years, maximum rates being specified.

27. Were they not limited also to certain localities?—The Chester and Holyhead Company did not apply for wide powers as regarded localities, but the London and South Western Company did. They were limited to Havre and the Channel Islands.

28. In 1849 do you recollect an application being made by the South Eastern Company?—The South Eastern Company applied for very wide powers in 1849; we opposed them, and they were obliged to withdraw their application.

29. Was that application for the power to run to all ports in Belgium and France?—Yes, in connection with the ports they supplied by railway.

30. After 1849 there was an interval of three or four years, was there not?—Yes. The next application was, I think, in 1853; then the South Eastern Company renewed their application.

31. They asked for very wide powers, did they not?—Yes, they asked for very wide, and got very limited powers; they were allowed to trade between Folkestone and Boulogne, and between Dover and Calais, with a limitation to 14 years.

32. They had asked for powers to run generally to any port, had they not?—Yes, generally to any continental port.

33. In 1855 was any application made by the London and North Western?—In 1855 the London and North Western, the Chester and Holyhead, and the City of Dublin Steam Packet Companies, jointly, brought in a Bill to enable them to give improved communication between England and Ireland. On the part of the Chester and Holyhead Company it was nothing more than a continuation of their powers, but it was new so far as the London and North Western Company were concerned. They obtained their Bill with limitations; the passenger and parcel traffic was given to them.

34. Mr. *Algernon Egerton.*] Was there any limitation in the number of years for which that power was granted?—Their powers were, as well as I remember, extended for nine years.

35. *Chairman.*] In the same year, 1855, was an application made by any Scotch company?—The Glasgow and South Western Railway Company applied for power to run steamers between Ardrossan and various ports in Ireland. The Committee refused the power, or rather, before they went into Committee, the Company limited their application to Belfast; and when they went before the Committee, the Committee refused the power altogether.

36. I think another application was made in the same Session by the Manchester, Sheffield, and Lincolnshire Company, which was rejected, was it not?—That was rejected. They proposed, I think, to run from Grimsby to continental ports.

37. In 1858 was another application made and refused?—The South Eastern Company again tried to extend their powers in 1858, and were obliged to withdraw their Bill; we opposed them.

38. In 1860 was any power which had not been granted before granted to any railway company?—1860 was the first year in which a railway company (the London, Chatham, and Dover) applied for these powers unopposed. We were not aware of their intention. They brought in a Bill, entitled a "Metropolitan Extensions, &c., Bill." We fancied that that related to London and to the railway exclusively; we had not the least idea of what they intended; and it was not till it had passed the stage at which we could petition that we heard of their intention to apply for power to own steamboats. It was then too late to petition in the House of Commons, but we determined to oppose in the House of Lords. In the meantime Mr. Churchward, one of our constituents who was interested in the mail traffic between Dover and the Continent, came to the Association and asked what course we proposed to take. We told him we intended to oppose the Bill in the House of Lords. He stated that was his intention also. He proposed that we should have the same counsel, and we consented. He said that he believed the application was mainly intended to

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put a pressure upon himself, to induce him to come to an arrangement with the company, and that they had no intention of going on with the Bill. In order to ascertain whether that was the case I called at Messrs. Freshfield & Newman's, the company's solicitors, and learned that, in substance, that statement was correct. However, they went on with the Bill, notwithdrawing the clause; and when they reached the Committee of the House of Lords, a compromise was entered into between Mr. Churchward and the company. The effect of that compromise, in fact one of the conditions of it, was that he should withdraw his petition, and get us to withdraw ours. He did not consult us in the matter, but suggested to Sir Frederick Slade, our joint counsel, to withdraw both our petitions; which he did, and we were thereby put out of court.

39. Without going into details, we may take it that the opposition of the Steamship Owners' Association to that petition was withdrawn through inadvertence?—They were not aware of what had been done till it was too late to rectify it.

40. The Bill passed in its original state, did it not?—I believe so.

41. Can you tell us what were the powers obtained by the London and South Western Company in the same year?—They brought in a Bill to extend their powers, under the title of "Kingston Extension." We had no idea, for the same reason as in the other case, that it contemplated any such purpose in reference to steamboats, and we did not oppose it. It was only when it was too late that we discovered that they had obtained a conditional extension of their steamboat powers.

42. In 1861 was anything done to limit the power of the London, Chatham, and Dover Company?—In 1861 they applied for power to raise fresh capital; I think they asked for 150,000 *l.* for their steamboats, in 1860.

43. In 1861 they asked for a large extension of capital, did they not?—Yes. In their Bill there were no words relating to steamboats, but by one of the clauses they proposed to apply this large capital to the purposes of the Metropolitan Extensions Act of 1860. The Committee held that we were not entitled to a *locus standi*, because the word "steamboats" was not in the Bill; but in the discussion upon the argument for the *locus standi*, our case was so far elicited that the Committee expressed a strong opinion that the power should not be granted unless they limited the ports to which it was to apply. The result was that they restricted them to plying between Dover and Rotterdam or Boulogne or any intermediate ports.

44. In the Session of 1861, did the South Eastern Company obtain an increase or a renewal of their powers, but restricted to the trade to Ostend, in addition to the other ports to which they had already powers?—Yes. The London, Chatham, and Dover Company having got rather more power than the South Eastern Company possessed, under their Steamboat Act, the latter applied for an extension of their powers to continental ports, and the Committee refused them permission to trade to any continental port, except Ostend; they had asked for very wide powers.

45. Mr. *Pollard Urquhart.*] In what year was that?—In 1861.

46. *Chairman.*] Do you recollect that in the same year an application was made by the London and North Western Railway Company for a continuation in their favour of the powers granted, in 1848, to the Chester and Holyhead Company?—The undertaking of the Chester and Holyhead Company had merged in the London and North Western Company, and as the period of 14 years had nearly expired, the London and North Western Company applied for an extension of the time. There was another clause in the Bill which was somewhat doubtful, but it appeared to us that the object was to apply a large portion of their capital to their steamboat undertaking; we therefore objected to both clauses. The Committee granted a renewal of the powers, but limited the time.

47. The Committee limited the time to a period of nine years, I think?—Yes.

48. Can you give the Committee any other cases in which powers of this kind were sought and refused in the same year, 1861?—I think there were some very unimportant cases: the Limerick and Foynes Railway Company was one, I think; we opposed their Bill, and they withdrew it. In the same year there was the Rhyl Harbour Company's Bill. I am not sure about the result of that application.

49. And the West Hartlepool?—The West Hartlepool applied for powers, but

but they were wholly refused. They asked for very wide powers indeed, from Hartlepool to the Continent of Europe.

50. Now we come to the year 1862; do you recollect what were the principal Bills containing powers of that kind, which were introduced in that year, and what became of them?—The four important Bills were the Eastern Counties, the Lancashire and Yorkshire, the London, Brighton, and South Coast, and the Furness; there were also two other unimportant ones.

51. The other two applications were mere questions of ferries, were they not?—Quite so.

52. What became of those four important Bills?—The Eastern Counties Bill was wholly refused; the Lancashire and Yorkshire Company withdrew their Bill in consequence of our opposition; the London, Brighton, and South Coast Bill was refused, with the exception of the trade between Newhaven and Dieppe; and the Furness Bill was limited in the House of Commons, and before the Bill reached the House of Lords it was withdrawn.

53. It was in 1862, I think, that a Standing Order of this House was passed upon this subject, was not it?—The railway companies had been in the habit so frequently of including an application for steamboats under the term "other purposes," that it was thought very desirable to introduce a Standing Order which would oblige them to bring in a special Bill. The House of Commons passed a Standing Order, providing that except when the proposed communication was to connect portions of their line, either constructed or about to be constructed by the company, the Bill should be a special Bill for that purpose.

54. In 1863, were three Bills upon this subject introduced?—There were three Bills in 1863, the Morayshire, the Great Eastern, and the North British.

55. The Morayshire Company's Bill proposed to take verylarge powers, did it not?—The Morayshire Bill proposed to take very large powers, but the company were restricted to Lossiemouth and a point further north. The Great Eastern Company proposed in the first instance to take very large powers, and then limited the Bill to Harwich and Rotterdam, Flushing, and Antwerp. That power they obtained. The North British Company obtained their power as between Port Silloth and Carlisle and Belfast, but were refused the application as regards other Irish ports.

56. It happened, did it not, that in the cases of the Great Eastern Company and the North British Company there were reasons which prevented the opponents from bringing forward evidence against the Bills?—We were informed by Mr. Woodd, the chairman of the Committee in the House of Commons, that he merely wished to hear the question of principle discussed, and that he did not think it necessary to go into the details; and therefore, although we were ready with witnesses to go into the details, we withdrew them.

57. Looking generally at the history of the question since 1846, it would appear that there has been no one policy constantly and steadily pursued by Parliament, would it not?—That is so.

58. But that from the first the steamboat owners have contended against these powers being granted to railway companies?—Yes, from the first.

59. It appears also, if I mistake not, that in every case their claim to be heard has been conceded, and that in the majority of cases their opposition has been either wholly or partially successful?—Yes. The result of our various oppositions is this, that with the single exception of the case of the London, Chatham, and Dover Company's Bill (for the London and South Western can scarcely be considered an exception), we have either wholly or in part succeeded in every case. I ought to mention to the Committee, that the South Western Company, who obtained an extension of their time in 1860, applied two years since for power to apply a very large portion of their capital to the various purposes sanctioned by the preceding Acts. Before that Bill went into the House of Lords I saw Lord Redesdale about it; and Lord Redesdale said that he would not allow the Bill to go forward unless the companies stated specifically how much of their capital was to go to steamboat purposes; and he allowed them to state in the Bill a sum that would cover the amount originally specified in 1848, and some thousands more.

60. You have stated to us the history of this question since 1846, and your own attention has been continually given to this subject, I think, for a great many years past. Will you now inform the Committee of the principle upon

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which you think that these powers should not be granted to railway companies?—I am not prepared to go into the general question at present. I shall be happy to do so on a future occasion, and to express the views which we have always contended for. The result of the different oppositions is shortly this, that the London, Chatham, and Dover Company obtained their powers for the reasons which I have mentioned. But in no less than 10 cases we have succeeded in part in modifying Bills. No less than five Bills that we have petitioned against have been withdrawn, and six Bills have been wholly refused. I can hand in a statement showing these results.

61. Mr. *Hodgson.*] At some future time you will be able to state the grounds upon which you object upon principle to railway companies having these powers?—Yes.

62. Mr. *Massey.*] I understand that your evidence comprises the whole history of this question?—It does.

63. Mr. *Kinnaird.*] With reference to the Chester and Holyhead Company and its application for an extension of powers, was not there a recommendation of a special Committee which sat in the previous Session, that such additional power should be granted for the improvement of the traffic between Ireland and England; it was a special matter, was not it?—Quite so; that was in 1855.

64. The Committee sat upon the subject of the improvement of the communication with Ireland, and it was under these circumstances, that recommendation having been made, that the joint powers were granted?—Yes; there was a special Committee which sat upon the question of an improved communication with Ireland, and in consequence of their recommendation the company brought in their Bill in 1855.

65. Mr. *Algernon Egerton.*] Do you know the names of the Bills introduced this year with reference to the subject?—There are five Bills introduced: the Brighton and South Coast Company's; the London, Chatham, and Dover Company's; the Aberystwith Company's; the Portpatrick and Donaghadee Company's; and the Manchester, Sheffield, and Lincolnshire Company's.

66. Mr. *Hodgson.*] You are the Secretary of the Steamboat Association, I think, are you not?—Of the London Steamship Owners' Association.

67. What is that association composed of, and what is the constitution of it?—It is a representative body, and represents the interests of a large number of the steam-ship companies of the country.

68. Is there any qualification required to be a member of your Association?—The members represented on Committee must possess a certain tonnage. The association consists of owners of steamers, and they subscribe in proportion to their tonnage.

69. Having a certain tonnage, do they subscribe and become of right members of the association?—They have a right to have a member on our committee.

70. On having a tonnage do they assume the right to belong to the Association, or is there an election?—No, there is no election; any company can claim to be members of the association.

71. What are the objects of the association?—To promote any object which tends to the benefit of the steam-shipping interests, and to oppose anything that may tend to their detriment; it is chiefly an association for Parliamentary purposes.

72. Have you any written or printed statement of their objects by which to guide the proceedings of the association?—Yes, we have rules.

73. Will you hand them in?—I have not a copy with me.

74. Perhaps on another day you will be able to produce them?—Yes.

75. How does this association take action upon these railway cases, or upon any case?—If it is a case strictly within the province of a Government department, we wait upon them, and see if we can get them to interfere. If, for instance, it is a case which we think the Board of Trade should take action upon, before going before Parliament we wait upon them; if the Board of Trade should not report specially upon it, we petition in the usual way against the Bill, and appear before the Committee.

76. Does the association take any action against particular steamboat companies, or individual owners of steamships in any case?—I am not aware that they have ever done so, except on one occasion, when the North of Europe Steamship Company applied for a charter several years ago (I think it was in 1852:

1852): they opposed the concession of that charter, and successfully. That was at a time when the Limited Liability Act was not in operation, and they thought they were justified in doing so.

77. You stated just now that the opponents of the Great Eastern Bill of last year were not heard by the Committee; does that observation apply to the House or Commons or to the House of Lords, or to both?—It applies to the House of Commons.

78. The House of Commons only?—To the House of Commons only.

79. Were the opponents heard in the House of Lords?—No evidence was offered by the opponents in the House of Lords.

80. Not upon the Great Eastern Bill?—None.

81. You say distinctly that no evidence was offered by the opponents upon the Great Eastern Bill?—None that I can recollect.

82. I did not quite catch one answer which you gave. You said, I believe, that Mr. Woodd, the Chairman of the Committee in the House of Commons, said something to you. Will you repeat what you stated?—Mr. Woodd conveyed to our counsel the impression that he did not wish to hear evidence upon the details of the case, and that he wished us to confine our remarks simply to the question of principle. We should have called evidence but for that intimation.

83. Mr. *Hutt.*] The object of the association, as I understand you, is chiefly to watch how the Legislature proceeds in matters connected with shipping?—Yes.

84. Are you connected with shipowners' societies in the outports?—With no shipowners' societies as such; only in so far as their members are members of our association.

85. In the event of any Bill being presented to Parliament to which you have an objection, you place yourself in immediate connexion with them?—Yes.

86. In fact, you attempt what is called an organised opposition to whatever is objectionable?—To whatever may be looked upon as objectionable.

87. Mr. *Clay.*] In connexion with the concession of power in 1847 to the Chester and Holyhead Company, is it in your recollection that that concession was coupled with a condition, which the company undertook to carry out, that they should give a large sum (I think 100,000 *l.*) to the improvements of Holyhead Harbour?—My impression is that the company had undertaken to give a contribution of 200,000 *l.* towards the construction of the harbour.

88. That case, in many of its aspects, would be quite a special one, would it not?—Quite an exceptional case. Sir John Lefevre (who, as Mr. Lefevre, reported very fully upon those Bills) stated in his report the grounds upon which the concessions were recommended.

89. Mr. *Pollard Urquhart.*] In the majority of cases where the railway companies have applied for power to run steamers, have the applications been connected with promises as to time and fare?—In two or three cases they have inserted in their Bills clauses as to the fares.

90. Have they been in connexion with the trains and the means of conveyance, so as to offer to Parliament a complete communication going to a particular inland centre upon the Continent?—They have alleged, in some cases, as a reason for the concession that, owing to a perfect understanding between the railway companies upon the Continent and here, they would be able to afford great facilities to the public in the event of their obtaining these powers.

91. But no provisions have been inserted upon that subject in any of the Bills?—None.

92. Is there anything to prevent steamboat proprietors from entering into arrangements with railway companies to afford facilities to the public, working especially with one railway company?—None whatever.

93. Do they not do so?—They do. I may mention, as an instance of that, the London and North Western and the City of Dublin Steam Packet Companies.

94. In conducting the traffic from the West of Ireland to London there are three distinct companies engaged, are there not: the Irish Railway Company, the City of Dublin Steam Packet Company, and the London and North Western Railway Company?—Quite so.

95. There is nothing to prevent other companies managing the traffic in the same

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same manner, is there?—No. In fact, I believe the City of Dublin Company have through rates with the Lancashire and Yorkshire and some other companies.

96. Do not the different railway and steamboat companies settle their shares at the clearing-house?—Yes; the City of Dublin Steam Packet Company is a member of the clearing-house.

97. Consequently there is no objection to admitting steam companies to be members of the clearing-house, is there?—None whatever.

98. *Chairman.*] Can you give the Committee the names of the Bills introduced this year which contain powers of the class to which you object?—These five Bills contain the powers to which we object. First, the Aberystwith Company's Bill; I have heard since I came into the room that that is withdrawn. Besides that, the London, Chatham and Dover, the Brighton and South Coast, and the Manchester, Sheffield, and Lincolnshire Railway Companies' Bills; these are the three Bills we specially object to. There is also the Portpatrick and Donaghadee case; that is somewhat different.

99. Will you put in, as a supplement to your evidence, a summary of the cases which you have mentioned?—Yes.

[*The same was handed in, and is as follows*:]

SUMMARY of Cases not being merely Ferries across Rivers or Estuaries.

Bills Unopposed.

1860. London, Chatham, and Dover Railway.
London and South Western Railway.

Bills Modified in consequence of Opposition.

1848. London and South Western Railway.
Chester and Holyhead Railway.
1853. South Eastern Railway.
1855. England and Ireland Improved Communication.
1861. London, Chatham, and Dover Railway.
London and North Western Railway.
1862. London, Brighton, and South Coast.
Furness Railway.
1863. Morayshire Railway.
Great Eastern Railway.
North British Railway.

Bills withdrawn in consequence of Opposition.

1847. Eastern Counties Railway.
1849. South Eastern Railway.
1858. South Eastern Railway.
1861. Limerick and Foynes Railway.
1862. Lancashire and Yorkshire Railway.

Bills wholly Refused.

1847. Chester and Holyhead Railway.
1848. London, Brighton, and South Coast Railway.
1855. Glasgow and South Western Railway.
Manchester, and Sheffield and Lincolnshire Railway.
1861. West Hartlepool Railway.
1862. Eastern Counties Railway.

100. Mr. *Adair.*] What are the four Bills of this Session to which you object, the London, Chatham, and Dover, the Manchester, Sheffield, and Lincolnshire, and the London, Brighton, and South Coast, and what other?—The Port Patrick and Donaghadee; that is less objectionable.

101. Why do you not object to the last?—We do object to it.

102. You stated it was not so objectionable as the others?—I think it is not so objectionable for this reason, that in that case the power is very limited; whereas in the other cases it is a very wide power.

103. Sir *Francis Goldsmid.*] You mean limited as to place, I suppose?—Chiefly as to place.

104. Mr. *Kinnaird.*] What is the date of the formation of your association?—One thousand eight hundred and forty.

105. Mr. *Adair.*] Are there many members of your association representing the interests of the Humber, the Mersey, and the Clyde?—We have a very large number in each case.

106. They are members as individuals, and not as representing any particular shipping association?—Quite so. Perhaps it is hardly correct to say the Mersey; it is true of the Clyde and the Humber. The Mersey is chiefly an agency port. The companies that trade with the Mersey have for the most part only agents there; for instance, the City of Dublin Company is a member of our association; the Dublin and the Glasgow companies trade with Liverpool, and they are members as Dublin and Glasgow companies.

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107. *Chairman.*] YOU are the Mayor of Hull, I think?—I am, and represent the town council here.

108. Together with your partner and others, you own 10 large steamers belonging to the port of Hull, do you not?—Yes.

109. I need not ask you whether there is a large steam trade belonging to Hull?—There is a very large trade.

110. Is the statement accurate which I have before me, that the registered tonnage of your vessels out of the port of Hull is about 50,000 tons?—About that.

111. I need not ask you whether the population of Hull is not large, and whether a considerable proportion of that population does not depend upon the business of the port?—The population is large, and the great bulk of the labour depends upon the shipping.

112. Have you at any time experienced a deficiency of steam vessels to carry passengers or merchandise to the Baltic or North Sea ports, or to Antwerp?—There was never any want of steamers; there has been a want of goods.

113. Sometimes there has been a want of employment for the steamers that are there?—Very frequently.

114. I apprehend that there is no monopoly in the hands of any one firm or company of the trade from Hull?—No.

115. It is a good deal divided?—It is very much divided.

116. Is Hull, in your opinion, the natural place for export and import, for goods going from and to the eastward on the one hand, and the manufacturing districts of Yorkshire on the other?—It is the nearest port to the manufacturing districts, and it has, in addition to railway communication, canal and river communication also to almost all the manufacturing districts.

117. Therefore, under a system which gives equal advantages to every port, you think that the traffic from the Baltic and the North Sea ports will always go by way of Hull to those districts?—Yes, the bulk of it.

118. Has there been any proposal to divert traffic from Hull by giving powers to a railway company to establish a line of steamers to any other port?—There have been frequently such proposals.

119. What are the ports which it is proposed so to favour at the expense of Hull?—In the Session of last year the Bill of the Great Eastern Company attempted to divert traffic from us; in fact the evidence went strongly to confirm the belief that there could be no sufficient traffic without diverting it from Hull.

120. What port did they propose to ply to?—The Great Eastern Company proposed to run steamers from Harwich, and the evidence was that the traffic from Manchester, Leeds, and so on, in fact from all the manufacturing districts, could be taken there at equal rates to those which are now charged by way of Hull, and in this Session a Bill is being promoted by the Manchester, Sheffield, and Lincolnshire Company, which, of course, would compete very powerfully with Hull.

121. What port do the Manchester, Sheffield, and Lincolnshire Company propose to use?—They propose to go from Grimsby.

122. I need not ask you whether a first class railway company with its large capital would not compete upon very unequal terms with private individuals?—No doubt of it.

123. Would that inequality exist, in your opinion, as between a railway company and a large company formed upon the principle of limited liability, which should confine itself to the owning and working of steamships?—No doubt of it; the railway company being so powerful, and having such a large capital.

124. You would put it thus: that, in your opinion, no company, however large, which confines itself to the owning of steamships, can compete with the railway company, which also owns steamships in addition to its railway undertaking?—It would be impossible, in my opinion.

125. Would you explain what the advantage possessed by the railway company would be?—The advantage possessed by a railway company would be this, that they take hold of the goods in the manufacturing districts, bring them to

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the port where they have their steamers, put them on board there, giving all the facilities that railway companies are able to do, and making no break at all, but carrying the goods straight away from the manufacturing districts to their destination.

126. So far would not that be an advantage to the public?—There might be an advantage to the public in the first instance; I do not deny that it is quite possible that there might be an advantage, until the railway companies ran off all competition, but not longer, inasmuch as at present there is ample competition to keep down the rates of freight to the very lowest possible paying point.

127. As I understand you, you state the argument in this way: that a railway company would be content to run steamships at a loss temporarily for the purpose of driving off all other competitors?—Yes.

128. Paying their expenses in the meanwhile out of the profits of their railway enterprise?—Yes; of course it would bring a very large amount of additional traffic upon their railway, which is their legitimate business, and for that they would be ready to sacrifice all the profits from the steamships. If the steamers simply paid their own expenses, the company would be satisfied and greatly advantaged by the additional traffic.

129. Is not that, to some extent, an advantage always possessed by a company with large capital over one with small capital. Might not a large company owning steamships adopt the same method of driving off the competition of private owners?—I think not; a large company having a large number of steamers, would be compelled to reduce freights to so large an extent as compared with the small competitors that they are always kept in check by that reduction. One man having a single steamer, reducing his freight, involves a similar reduction upon 10 steamers belonging to a large company.

130. Your argument, as I understand it, is this, that, however large a company may be, still, if it is confined to steamship business, it will not continue to run its vessels at a loss to drive off competitors?—I think not.

131. But that a railway company will content itself with a small profit, falling back upon the proceeds from the railway, in order ultimately to secure the steamboat trade also?—Yes, they would take a smaller profit upon the water; I think not upon the railroad.

132. You consider, then, that the effect of granting these powers to railway companies would be to create a monopoly in their favour?—Undoubtedly.

133. And that if the principle were generally extended there would be no competition between railways and private owners; the only competition remaining would be that of the great railway companies with one another?—Yes.

134. Do you think that any inconvenience might also arise in this way; that the railway companies might run trains to suit their own vessels, which trains would not suit the vessels of other owners?—Yes, that has been done.

135. Are you aware of any case in which that has been done?—Yes, in the case of Hartlepool; it happened there.

136. Mr. *Adair.*] That is what is called nursing their own traffic?—Yes, nursing their own trade.

137. *Chairman.*] Speaking from your own experience as a shipowner, should you be prepared to continue your business in the event of powers of this kind being granted to a railway company in such a manner as to enable it to compete with your trade?—I cannot conceive that it would be possible for us to do so for long, we might continue for a little time.

138. You consider also that the advantage to the public would not be permanent, because when competition was banished the railway companies would take the opportunity of recovering what they had lost, by raising their charges?—Yes, I think there is no doubt of it; I think that they would, in all probability, coalesce, as they have done in other cases, to get the traffic divided amongst them, instead of competing, and thus get advantage of the public.

139. Is it the general practice in Hull to charge through rates for land and water conveyance upon goods going from the inland districts of England to the Continent?—It is pretty generally done; it has been practised to a very large extent by my own house. We have now formed connexions by which we take

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hold of the goods in all the manufacturing districts, and carry them to almost every point upon the Continent and *vice versâ*.

140. So that, as far as it is a convenience to exporters to have only a single payment to make, that advantage is afforded them at present?—There is that advantage; when an exporter wishes to pay to the destination, he has the opportunity of doing so; the rule is only to pay down to the port.

141. Mr. *Massey*.] You are of opinion, if I understand you rightly, that there is sufficient competition at present in the shipping trade to accommodate the public at the lowest fares which are compatible with a reasonable remuneration?—I think there is much too great competition already; our steamers go away generally not three-quarters and often only half-full.

142. But you think that railway companies could nevertheless afford to forego any profit whatever from their steamboats, in consideration of the additional traffic which the possession of those steamboats would enable them to bring over their lines?—Yes, that was the argument they used last year.

143. I need hardly ask you whether that legitimate traffic, being the result of a demand on the part of the public, would not be an advantage to the public?—With respect to the additional traffic for that particular railway, I think it is simply taking it from one railway and giving to another railway; that is all the advantage. It does not increase the traffic of the country; it increases the traffic of a railway company; for instance, if the Manchester, Sheffield, and Lincolnshire Company obtained a Bill giving them power to run steamboats, they would secure the traffic as against the North Eastern Railway Company, but they would not increase it.

144. You state that the railway companies run trains to suit their own traffic?—They have done so.

145. Why should not the steamboats of independent companies accommodate their arrangements to the arrangements of the railway companies?—The usual course is to do so. Trains usually leave the evening before with goods for the steamer's intended sailing next afternoon, which gives time to get all on board; but it happened some years ago, in the case of the West Hartlepool Company, that trains would leave in the morning of a sailing day, and bring down goods for a special vessel in which the company alone were interested.

146. Would not these arrangements be permanent; would not the steamboat companies find the arrangements in the time tables of the company, so that the public would have sufficient notice of the time of departure?—It is possible that they might, but it was not so in the case I referred to; then it was not an every-day thing, it only happened on some particular days of sailing.

147. Mr. *Kinnaird*.] You look upon it then rather as a grievance when such powers have been granted to railway companies?—Of course I look upon it as a grievance.

148. In what shape is it a grievance; do you mean in respect of the expense which devolves upon you in resisting it?—No, in respect of the unequal competition to which we are exposed, when a railway company obtains such powers.

149. You find that the defending of what you consider your rights is a very expensive process, do you not?—No doubt of it.

150. Sir *Francis Goldsmid*.] Is your apprehension that the railway companies would continue this low rate of charge of which you have been speaking, or that they would first drive off private competition, and then raise their rate of charge for the freight of vessels?—I have not the slightest doubt that that would be the course taken; that has been the course taken by all companies to attempt to drive off smaller ones, and when they have succeeded, the invariable rule has been to get the rates up that they may be thoroughly remunerative; in fact, to make up the loss they have sustained during the time they were fighting.

151. Have there been any examples of that operation with reference to railway companies who have succeeded in getting rid of steamboat competition, or have they never got rid of it?—The railway companies that have got the steamboat power have got it more for passengers than for goods, and they have not obtained Bills relating to any port near enough to affect my own port seriously. The nearest is the Great Eastern, and that of course has not had sufficient time to develope itself yet. There is no doubt that it will affect the port with which I am connected.

152. What you have been speaking of as your apprehension that railway companies will raise their fares or their freights after getting rid of the competition

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petition against them is at present only an apprehension, which there has not been time for experience to prove or disprove?—So far as our own port goes, it is more an apprehension than the experience of anything which has actually taken place.

153. Mr. *Adair*.] In the case of several railways reaching the same port, do you anticipate any arrangement between themselves by which one company shall own the steamers, but that the others shall share in the profits of the sea traffic?—I do not suppose that such a thing would take place; my impression, or rather belief, is that if one company coming to any town were to obtain such power, the other company would, in self-defence, be compelled to obtain similar powers; and the chances are that in any town having two lines of communication there would be two companies having steam powers.

154. You do not, then, anticipate any such arrangements for the sharing of the sea traffic between the railway companies, as exists in reference to the land traffic?—I have not the slightest doubt that that would be the result of it; that they would put their heads together in a short time, with a view of making up for any loss, after driving all competition out of the way. That has been the case so far as all the railway companies have gone. In the case of Hull, we have two companies; they coalesced, and divided the whole traffic between them, not giving any advantage to the public.

155. Mr. *Algernon Egerton*.] There are cases of a railway company owning a port of its own: for instance, the Manchester, Sheffield, and Lincolnshire owns Grimsby, I believe?—They do.

156. Do you think that independent steamboat companies could trade from such a port upon the same terms as the steamboats belonging to the railway company?—I think no private individual would attempt it for a moment.

157. Supposing that some Parliamentary maximum was fixed for the sea rates, do you think that that would make any difference?—It might make a difference if the minimum rates were fixed so that private individuals could live at the rates fixed; but at the same time the facilities that the railway company could give to their own boats would be such that I do not think private owners could successfully work any trade.

158. The railway companies would give facilities, for instance, in discharging and loading?—Yes, in discharging loading, warehousing, and everything, in fact, as regards the docks.

159. You distinctly say that you think no independent company would have a chance against a railway company owning steamboats?—Not the slightest, I think.

160. Mr. *Lygon*.] I understand you to say, that for the railway companies to start steamboats would not afford any facilities to the public, because it would merely serve to divert the traffic from other channels?—Yes.

161. Is it not generally found as the result of competition, either between two ports or two steamboat companies, that it produces increased facilities to the public, and thereby increases the traffic?—It tends to bring increased traffic in many cases; that is to say, that it may bring goods by a certain route, which otherwise would not come by that route. I do not know that it increases the traffic of the country much, it increases the traffic of a particular port.

162. When the accommodation is increased, and the charges are diminished as the result of competition, is not the tendency to increase the amount of traffic?—Yes; but I think this step would merely increase the competition for a short time, and that it eventually would throw the whole trade into the hands of the railway company, who would, I do not know how soon, but eventually raise their rates, in order to get remunerative rates, and then all the advantages would be lost.

163. Mr. *Richard Hodgson*.] You say that you cannot conceive such a thing as a large steam navigation company or association tyrannising over individual shipowners; have you never known such instances?—Yes.

164. Have you known any combination of steamship owners run off individual owners of ships?—Yes, I have.

165. I thought you just now stated the contrary?—No, not in that form. I think there is a different feeling now. I believe that was the case to a very large extent at one time, but I do not think it is so to the same extent at present. We have great competition in Hull ourselves, but we feel that if we were to drive off any weak man, another would soon come forward instead

instead of that one. If any one coming into the trade is disposed to take remunerative rates, and not to run them down unnecessarily, there is really no feeling of hostility to such a competitor.

166. At Hull you do not apprehend any such tyranny from a powerful body as that which I mentioned? – No.

167. Has there ever been, within your recollection, at Hull anything of the sort?—Yes; among those who started in the steamboat trade first, when it was much more difficult to put on steamers; the more powerful companies certainly used that gentle sort of means to get the weaker men out of the way. But that has not been the case for at least 10 years.

168. What do you call the "gentle sort of means;" are they the gentle means which you suppose that railway companies will adopt towards steamboat companies?—Just similar means to what a railway company would be likely to adopt.

169. Can you give the Committee any instances of such tyranny having been exercised by companies of steamship owners against individuals?—I cannot give the names, because during the time that I myself have been connected with steamboats no such thing has been attempted.

170. I speak not of Hull only, but of other parts?—I cannot give it from my own knowledge.

171. You have stated, I believe, that there is no deficiency of steamboats at Hull for the trade?—None whatever.

172. There is a deficiency rather of traffic?—Yes.

173. At some other ports I suppose there is a deficiency of steam accommodation?—That may be; I do not know any case; wherever there is a trade we are always ready to send our steamers; we have our steamers at Hull, but we should be glad to send them elsewhere, if we could find employment for them elsewhere than at Hull.

174. Is it not the case that where a trade is established from a particular port, it is not easy to induce the owners of ships sailing from that particular port to send their ships to another port?—I should think there may be some of that feeling; I have none of it; I am glad to send my steamers where they can find plenty to do.

175. To that extent you would qualify the answer which you just now gave, by saying that there is a disinclination, on the part of steamship owners, to shift from one port to another, unless they are certain that there will be a large remunerative trade?—I think it would be very foolish for them to shift unless they are certain that there will be a good trade in the port to which they go. I may say that we have short trades and long trades; the short ones are for a week, and the long ones for a month. During the winter particularly, there is very little to do in the long trades; and at that time our steamers, unless they find employment elsewhere, are not usually employed.

176. Supposing that there is a port where the trade is not very large, but where at the same time there is some trade, or there would be if any vessel sailed from it, and supposing that there is a railway to that port, and no steam navigation company, or individual shipowners, are prepared to establish a trade there; does your antipathy to the railway company's powers go to such an extent that you would deny to the railway company, in that case, the power to have ships of its own?—I would not allow it.

177. On what ground?—On the ground that there is no advantage to the public; it is an advantage to the railway company, but the railway company was not established to have such advantages from the sea trade, and the public is not benefited, inasmuch as the goods would find their way to the port where there was sufficient steam communication.

178. I assume that there is a port, with a railway to the port, and a trade to be done. You think then that it would be no advantage to the public to have steamboats running from that port to other ports?—Yes.

179. What is the port from which the Manchester, Sheffield, and Lincolnshire Company propose to run steamers?—Grimsby.

180. Do any steamers run from Grimsby now?—Yes.

181. Where do they go to?—To Hamburgh and the Baltic, and some French ports; Dieppe, for instance.

182. To what ports do the Manchester, Sheffield, and Lincolnshire Company propose

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propose to run steamboats?—They propose to run their steamboats to almost any and every port between France and Cronstadt.

183. You are afraid that if that railway company, or any other railway company, has the power to run steamboats, and does run them in connexion with their railway traffic, they would, by charging very small rates for the sea voyage and larger rates upon the railway itself, be able to run off competition on the part of the shipowners?—That is my belief.

184. And by means of a through rate?—Yes, by means of a through rate, or in this way, that they would obtain a traffic upon their rails that would pay them amply, if there should be no profit on the steamboats at all.

185. By means of a through rate, charging the rate over sea with the rate over land?—Yes, that would be another mode.

186. Through rates exist between railway companies and steam companies, do they not?—Yes.

187. Would there be any difficulty in Parliament's insisting upon a division of the rate into two; into the sea and the land rate?—There would be no impropriety or difficulty if a sufficient margin were allowed for the steamers.

188. My question is, would there be any difficulty in Parliament's insisting on a division of the rate into two, a sea and a land rate?—No.

189. Supposing that were the case, and that Parliament were to say we will insist upon railway companies giving the same rates for through traffic coming over their railway, and over the sea by means of independent ships, as for traffic carried by a through rate upon their own railway and by means of their own ships; would not that give the necessary protection to the steamboat proprietors?—It would give some protection, particularly provided the steamship owners had something to say upon the fixing of the rates; but if it were left to the railway company themselves, I am afraid there would be very little chance of the steamship owners existing.

190. You admit that a reduced rate is likely to happen from the railway companies having the power to put on steamships?—Only temporarily.

191. You will admit, I suppose, that it is a benefit to the public to have railway trains and steamboats running in conjunction with each other?—No.

192. Do you mean to say that that is no benefit to the public?—No benefit to the public that I am aware of.

193. Would you say that it is no advantage to the public that goods or passengers should not be kept waiting in a port after the arrival of a train until the vessel sails, instead of the vessel sailing upon the arrival of the train?—It is impossible for the thing to be done; when a train arrives it must bring something with it for the ship; and as for goods, it must take some hours in order to get them from the railway and put them on board the ship. If it is passengers, that you allude to, we have fixed hours for sailing, which the railway trains suit; in fact the steamboats are advertised to sail as soon as such-and-such a train arrives. For passengers everything is done to meet their convenience. And, so far as goods are concerned, we give the steamers only so long after the goods arrive as is requisite to get them on board.

194. Perhaps I misunderstand you; I thought you stated that the railway companies would fix the departure of their steamships to correspond with the arrival of the trains?—They might run trains to suit some particular boat, and not in accordance with the present times of sailing.

195. Did I understand you correctly or incorrectly when I thought you stated that there would be a disadvantage arising to other steamboat owners, from the practice which the railway companies would probably institute, of running their steamers in connexion with their trains?—I spoke of the trains being run to suit their own ships.

196. Do you think that that is an advantage or a disadvantage to the public?—In some cases it will be an advantage to the public; but I do not know that it would be of any important advantage to them.

197. Mr. *Clay*.] You were asked by the Noble Chairman whether the disadvantage which you appeared to fear of coming into competition, with a very large capital, must not be equally feared by a private trader, who might be the owner of one or two steamships, in competition with a very powerful company; I presume that you do not deny that if a battle of purses is fought, there is a considerable

considerable advantage to the longer purse of the two?—To the larger purse undoubtedly.

198. Do you know the amount of the capital of the Manchester, Sheffield, and Lincolnshire Company, taking that as one of many instances?—Speaking roughly, I think it is something approaching to ten millions.

199. From your experience of shipping, is it at all possible that there should be any steamboat company with limited liability, or even without it, with anything like such a capital as that?—Certainly not.

200. Then I presume that, without saying that there may not be some disadvantage to a private trader as compared with a steamboat company, your objection is to let into the competition a capital so enormous that it can never be faced by a similar capital upon the part of the shipowners?—Yes, that is my view.

201. You made use of the expression of the traffic upon the railway being increased by its getting powers of this kind. If I understand you rightly, the word "increased" was not the word which you wanted to use; you rather meant that it would be displaced?—I meant displaced from another company.

202. That it would be taken from one company, and given to the other without there being any very great general increase of accommodation to the public?—Yes.

203. Is it possible that that might be done even at some inconvenience to the public, that is to say, that a railway company having those powers would be enabled to take traffic by a round-about way, when otherwise it would have gone by the natural course?—Yes, that is so.

204. The Manchester, Sheffield, and Lincolnshire Company are owners of the docks, I think at Grimsby?—They are.

205. As owners of the docks, do they give any advantages to vessels taking coals or anything else from their docks, which would not be given to vessels from Hull?—Yes, certainly.

206. What advantage do they give?—Speaking from my recollection at present with our own vessels, if we load from Grimsby, we pay there 1 *d.* dock dues, against 1 *s.* in Hull; it is a nominal charge to induce ships to load there.

207. They relieve the ships carrying coals from Grimsby of the dock dues in fact, is that so?—As to coals I am not able to speak, but with other goods to induce us to send our steamers to Grimsby, they charge us instead of 1 *s.* a ton, as we should be charged in Hull, only 1 *d.* per ton.

208. You say that a maximum rate where railways are owners of steamers might be fixed by Parliament, distinguishing between what was carried by land and what was carried over sea, and that that might in some degree relieve you of the danger you fear; I presume that there are a thousand other ways in which a railway company might favour its own ships and inconvenience private owners, especially where the railway company are the owners of docks, for instance in the berths and in many other ways?—Yes, they might not give us the same facilities to discharge our steamers, and take off our goods as they would to their own vessels.

209. A question has been put to you whether you would object to a railway company being the owner of ships in the case of a railway, which runs to some place where there either was an established trade or the promise of a good deal of trade, and no ships to carry it?—Yes.

210. From your experience as a shipowner, do you believe in the existence of any such place as a port that promised a trade, and to which the shipowners would not go?—No, certainly not; we are all so anxious in looking out for a place where we can find trade for our ships, that if there was anything to be done we should all of us only be too ready to go there to employ our ships, because sometimes we should have no traffic if we did not.

211. Mr. *Pollard Urquhart.*] You stated, I think, that railway companies could run trains in connexion with their steamers at economical rates?—No.

212. At rates so low as to beat you out of the field?—They might do that.

213. Is there anything to prevent your entering into agreements with the railway companies to take the things at cheap rates, and to afford the same facilities as if the steamers were owned by the companies themselves?—There is nothing to prevent those arrangements.

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214. Cannot an old established company always make an addition to its trade at less rates, with a reasonable profit to itself, than any new company can set up a trade?—I think not as regards railway companies; if they were putting on steamers as against private individuals, as a matter of course they would want the whole of the traffic, and they could obtain it by many means that they possess which we do not possess; for instance, if they made a through rate, in order to get rid of competition, of 30 *s.* from Manchester to Hamburg, or any other place, they could charge for the railway transit nominally 25 *s.*; it makes no difference to them, as it all goes into their pocket; and by that means they would force us down to a 5 *s.* rate, which would not be remunerative. That is one mode by which they could drive us out of any trade; and as soon as we were driven out of the trade, my opinion is that the public would not be benefited, because they would raise their rates when the competition was gone.

215. By starting ships in connexion with their railway trains, they would take additional passengers. Is it not the case that by far the greater part of what you receive from the passengers is clear profit, you being an established company already?—No, it is not.

216. A very large part of it must be clear profit upon the passengers and goods?—Of course, from passengers and goods together all our profit is obtained.

217. A very large portion of the additional receipts you get thereby is clear profit, because you have all the expense of the ships and all the necessary charges of the company going on; so that almost any additional traffic is clear profit?—The traffic that we get is the traffic that is brought by the railway; the local traffic is never anything very large; the bulk of the traffic is from the interior, from the manufacturing districts.

218. First of all, does not the railway tend to bring additional traffic?—Certainly.

219. Is not a very large portion of the receipts that that traffic brings in clear profit?—It is just the same proportion as that which arises from the other traffic; I could not make any distinction. For instance, if you were taking 500 tons in a ship, perhaps out of that, locally, from our own district, we may get 100 tons, and from the interior we may get 400 tons. If we were relying entirely upon local traffic we could not exist at all; we must take the two together, the local traffic and the traffic brought from the interior, to make a living out of it.

220. If you were to enter into arrangements with railway companies to sail ships to suit their trains, and enter into some arrangements about through fares, that would bring additional profit, would it not?—It might.

221. Would it not?—It would, in the first instance. If we, in Hull, were arranging with the railway companies, and others elsewhere were not arranging with the railway companies, it would bring to us, in Hull, an additional traffic.

222. A very large portion of this additional traffic would be clear profit; there would not be much sinking of capital in order to carry on that traffic; and therefore a very large portion of the receipts accruing to you by entering into the arrangement would be clear profit, would it not?—Any increase of traffic that it would cause would, of course, be an advantage to us.

223. When a railway company puts on ships of its own, the capital sunk in those ships may be clear loss to them, may it not?—Yes.

224. You certainly have the advantage over them, or you are at least upon equal terms, for you can do it, upon the whole, more economically than they could, seeing that a very large portion of the traffic you get is clear profit, while they may very possibly run at a loss to themselves?—It is quite possible that they might run at a loss; I think they would in the first instance.

225. Of course no company likes running at a loss to itself if it can help it? It would not continue to do so; it would only do so for a certain period.

226. Nobody likes a loss for a time, unless there is great prospect of gain afterwards, I presume?—No.

227. Is not that an inducement to the railway company to enter into arrangement with you, instead of sinking money to displace you altogether, and then raising their fares?—I think they would rather promote their interests at some sacrifice, inasmuch as they would get rid of private competition, and be able to charge what they thought proper.

228. They

228. They cannot get rid of competition without loss in the first instance, can they?—Not without loss.

229. They do not like to incur that loss, I suppose?—If it was to get a gain in the long run they would sacrifice something at the present time, no doubt.

230. There is a limit to such sacrifice. Would not they enter into an arrangement with you, if it could be economically done, rather than make a sacrifice?—We should be very glad if they did; we are quite willing to enter into arrangements with them to avoid the other alternative.

231. The prospect of a ruinous competition set up by the railway companies may be a sort of inducement to the shipping companies to enter into arrangements with the railway companies, may it not?—There has never been any indisposition on the part of steamboat companies to enter into arrangement with the railway companies; but the object of the railway companies was, and now is, to put down the private shipowners altogether, in order to have the trade in their own hands.

232. Have you any objection to make against the competition of railway companies any more than against the competition of any other company?—The objection that we have to railway companies' competition is this: they have an immense capital, and if they lose something, it is scarcely felt at all; a loss of 10,000 *l.* or 20,000 *l.*, out of a capital of several millions, would not be felt by them, but it would be utter ruin to us.

233. I have heard it said that railway companies have made lines which are suckers instead of feeders to themselves. Would they not ruin themselves in the same way by running these steamboats that do not pay?—I think not, because they would get rid of individuals without seriously injuring themselves.

234. Is there any reason why steamers in connection with a railway company may not be suckers as well as feeders, if the company tried to run at low rates?—My impression is that they would very soon ged rid of competition, and raise their rates.

235. The Manchester, Sheffield, and Lincolnshire Railway is not paying very well, is it?—Not well.

236. Do you think that the shareholders would like to run a line of steamers in opposition to yours with the certainty of a further reduction of their dividend for some time?—It would not have that result; it would bring a very large amount of traffic upon their railway, which does not now come by them, and they would derive more from the carriage upon their line by the goods which they would get in that way than any loss they would be likely to sustain by having steamboats.

237. Would they not equally make more profit by entering into economical arrangements with your company; they would get the additional traffic along their lines?—I think not.

238. Do you not think that if they were to enter into arrangement with your company, you could serve the public as well as if they had steamers of their own?—I think we could serve the public better, but I believe the company would submit to a sacrifice to get higher rates for their own steamers.

239. It is a sort of prospective fear which you express that the public may be subject to higher rates?—That has been always the result of competition; when you get one of the competitors out, then the one that is left raises the rates.

240. *Chairman.*] What distinction do you draw between the competition of a railway company willing to make a temporary sacrifice upon its property in steamships, and the position of a large company owning steam-vessels trading to many parts of the world and equally willing to make a temporary sacrifice upon some one line of traffic with the same view of obtaining a monopoly of that traffic?—The difference between the two is this, in my opinion. In the first place, a railway company has an immense capital as compared with any other company that I am aware of; taking it at 20,000,000 *l.*, there are very few steam companies that have above from 1,000,000 *l.* to 2,000,000 *l.*; those are the exceptions; most companies are very small, comparatively. It would be, therefore, a very heavy thing to them, comparatively, to run as private individuals against a railway company. That is one view of it. And the second view of it is this. We companies who are spending our own money are not willing to waste it in getting rid of what you might call small competitors, because others rise up after one is gone. After the steamboat owners have

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wasted their money upon one man they are thrown again into competition with another; but if a railway company, having so much power, got any competitors out of the way, there would be scarcely any chance again for private individuals, for they could make such a combination amongst themselves as would prevent any competitor arising.

241. I understand you to say that you object to these powers being granted to railway companies, not merely because the railway companies are larger and wealthier than any bodies that could come into competition with them, but because railway companies have the power of making arrangements between themselves which would probably end in excluding competition; and also, because the railway companies possess privileges granted to them by Parliament securing to them a certain return upon their outlay, which privileges were granted for the purpose of improving railway communication only, and not for that of carrying on foreign trade?—Just so; for all those causes.

242. You put your objection upon the ground that Parliament has granted to them powers, which powers have a certain pecuniary value, and that they are therefore bound not to use those powers except for the object for which they were granted?—Yes, only for that purpose.

243. I apprehend that as this question arises locally, it involves not only the monopoly of the traffic of Hull by a railway company, but the diversion of that traffic from Hull to other ports?—No doubt of it.

244. Therefore we may take it that you are here to object not only to the occupation of the trade of Hull by a railway company, but to its being diverted from your port altogether?—That would be so in the first instance; my belief is that if it is granted to one company, say the Manchester, Sheffield, and Lincolnshire Company, the North Eastern Company (the other company coming into Hull) would be compelled to adopt similar means; and though they might not at first, yet eventually they would take all the trade, and if there were two companies it would tend much more to drive out all competition.

245. Mr. *Hodgson.*] Why would the North Eastern Company be compelled to acquire the same powers?—The North Eastern Company would be compelled to do so, because the Manchester, Sheffield, and Lincolnshire Company would make such arrangements as to be lower than the two present rates, the railway rate and the sea-freight.

246. Why would not the North Eastern Company, in conjunction with the steam-packet companies of Hull, compete with the Manchester, Sheffield, and Lincolnshire Company at Grimsby?—They might do so, but the Manchester, Sheffield, and Lincolnshire Company would be ready to forego all profit from their steam-vessels; they would lose nothing by losing all profit from that source, because they would get an increase of traffic and be nothing out of pocket.

247. Would not the North Eastern Company be obliged to do the same, to lose all profit also if they entered into the competition?—They do not require to lose all profit, as against the other company, because they have not steamers. You assume that they have not steamboats. It is upon the steamboats that the Manchester Company would be willing to give up all the profit.

248. I assume that the Manchester, Sheffield, and Lincolnshire Company run steamers from Grimsby. The North Eastern Company would do the same, you think?—Clearly, they would be compelled.

249. I want to know why the North Eastern Company could not do it with you, who are equally interested in making the arrangement, instead of following the example of the other railway company and getting steamboats?—Simply upon this ground, that if they were making arrangements with us they would have to pay us such rates as would remunerate us for sailing.

250. They would give you a rebate instead of running their own boats for nothing?—They might do so; it is not likely.

251. In point of fact, it is a contest between Grimsby and Hull as much as a contest between the steam-owners and the railway company?—No doubt it is both.

252. Mr. *Algernon Egerton.*] You are acquainted with the Railways' Clauses Act of 1863, I suppose?—Yes.

253. There is a provision in that Act (Clause 30) for securing equality of treatment where railway companies own steamers; can you state what the practical effect of that Act is? They are obliged to charge the same tolls to all parties;

parties; is that carried out in practice, or do they walk out of that provision?—I am not aware that it is carried out in practice; I am not acquainted with any case. *J. Lumsden, Esq.* 9 March 1864.

254. Do you know of any case where bonuses are given?—No.

255. Is it possible for the companies to do that unknown to the public?—It would be possible for the railway companies, with this clause, to destroy any private individual, inasmuch as they might fix a toll upon water-carriage so low as not to remunerate any shipowner.

256. I suppose a railway company with a large capital may employ their capital at their own port in making various works, warehouses, quays, and so on?—In warehouses they can.

257. They are limited to that?—For the facilities of their own trade, they may make them.

258. And building steamboats of a better class than private owners can?—I am not aware of that.

259. You think not?—No. Of course what they might do it would be very difficult to say; I think the steamboats built by private owners are now of as high a class as well can be.

260. You do not think that the vessels could be better supplied by the railway companies than it is by private owners?—I think not.

261. Mr. *Adair.*] Do you know any other port in England, of the same size as Grimsby, which is the property of a railway company?—Yes; railway companies have property in docks at several different places. The North Eastern Company have two ports, Jarrow and Sunderland, and the Hartlepool Company have West Hartlepool Docks. I will hand in a list of the steamers sailing from Hull during the year 1860, and also a list of the places to which we have through rates.—(*The same was handed in.*) *Vide* Appendix.

Henry John Atkinson, Esq., called in; and Examined.

262. *Chairman.*] YOU are President of the Chamber of Commerce of Hull, I think?—Yes. *H. J. Atkinson, Esq.*

263. You are a shipowner and agent?—Yes.

264. And Chairman of the Local Marine Board, and a member of the Town Council?—Yes.

265. I think your firm has one of the largest shipbroking businesses out of London?—Yes.

266. You have heard the evidence of the last witness?—Yes.

267. I presume you confirm what he says with respect to the port of Hull, as to its possessing a large steam trade, and as to the competition for the carrying trade?—Yes, we are quite satisfied with that competition. I ought to say that I am deputed by the Chamber of Commerce to give evidence in favour of the principle which is laid down of railway companies not being owners of steamers. The Chamber of Commerce, of course, is more a mercantile body than a shipping body; although it is called the "Chamber of Commerce and Shipp ng," the majority are merchants.

268. Will you shortly state the grounds of your opinion upon the question before the Committee?—We have a great many reasons for objecting to the principle. We consider that the capital of the railway companies has been raised for the land-carriage alone, and that the system of dragging the shareholders, by the decision of a board of directors, into a proprietorship of steamers would be very dangerous to them. We consider, also, that the disguise that the railway companies could effect by means of a through-rate, not showing the land and sea rates, would be detrimental to the mercantile community. And we object to it upon the ground that at the present time, if any fresh steam accommodation is needed, seven or more shareholders of any railway company could afford themselves or their company that accommodation by starting a limited liability company according to the provisions of the Act of Parliament; and if they lost money every year upon the steam-vessels, they would have to show it, and consequently there would be a check upon them, and the shareholders would see what they were doing. We object, also, on the ground of the large capital of the railway companies, such as the Lancashire and Yorkshire, the North Eastern, and other companies, having 20,000,000 *l.* or 25,000,000 *l.*

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of capital. They could afford to reduce their dividend to the extent of a single quarter per cent. per annum, and by paying 4¾ instead of 5 per cent., they could spend 50,000 *l.*; or, rather, they could afford to lose that amount for a time upon steam-vessels, and so run off the private competitors. And then, by means of those arrangements which railway companies are such adepts in making after the private owners were away, the mercantile interests of the country would be damaged by it, because they would put up their rates; and wherever the railway company happened to meet another company with their steamers, the traffic would be divided, as in the case mentioned by our mayor. In that case there were two competing routes, and after competing a little, an arrangement was made; and then, although the principal quantity of goods came by one railway, both the companies divided the profits upon the traffic.

269. There has been, I understand, such an agreement between the North Eastern, and the Lancashire and Yorkshire, and the Manchester, Sheffield, and Lincolnshire Companies?—Yes: by which, although most of the goods come by one line, and although a great quantity of them did not come by another competing route, yet that route shared the profit upon the traffic; so that although a competition was, in the first instance, secured by giving a second route, yet the public did not get the effect of that competition afterwards. We object further upon the ground of the ports and docks which are held by the companies. I can give instances in the case of the Grimsby Docks, where constantly, when vessels are chartered which have discharged their cargoes from foreign ports in Hull, they go down to the Grimsby Docks to load outwards, because the Grimsby Company allows a clause to be inserted in their charter-parties whereby they are free of dock dues under certain circumstances at Grimsby. That applies in this way: A ship having unloaded in Hull, the Grimsby Company say it is better for us to obtain one of the profits than lose both; so they say, if we can only obtain half the usual profit by our charge for bringing the cargo along the railway, we will give up the other in the shape of dock dues, and so induce owners to leave Hull for Grimsby, instead of loading where she had discharged her inward cargo.

270. Sir *Francis Goldsmid.*] Did not you state that the company had a profit whether the goods went by Hull or Grimsby?—This is a case of another kind of unfair competition with Hull, because the docks at Hull are owned by a company, who must secure a certain return upon their money; but the docks at Grimsby are combined with the railway undertaking, and if the railway company cannot get the whole profit, they take half of it. We also object to the preferences that can be given by companies under such circumstances to their own vessels in ports. And we also object to the fact that where one company owns two or more ports upon the east coast, for instance, taking our own case, they can ignore the distance from those ports to the manufacturing districts, and carry the goods, as they call it, equally, for one rate per ton, whether it is from the Tyne Docks or from Hull, that is twice the distance, at the same rate per ton. They call that making the rates equal. I quite agree with what the mayor said with reference to the North Eastern Company, namely, that if the Manchester, Sheffield, and Lincolnshire Company got power to run steamers, the North Eastern must go for it in self-defence. In that case the North Eastern Company, charging the same rate from the Tyne Docks as from Hull and other places, would have the advantage of being nearer to the coal; that will be a great advantage, of course, and they would soon have the whole matter in their own hands. We also object upon the principle that shipping is so essentially a business in itself that it is very liable to be mismanaged by those who are not thoroughly devoted to it. I think experience has shown that Railway Boards often make mistakes when they do business in shipping; and their plea is this. There was a case last year, when those who appeared for the South Yorkshire Company before the Committee of the House of Commons pleaded, when they were asked why they had debited the company with 20,000 *l.*, which had gone to the steamboat business, they said: "The fact is, the shareholders have lost nothing by that, because, although there is a loss of 20,000 *l.* in steam operations, a great quantity of business has been brought along our line which otherwise would have gone elsewhere, and consequently, upon the whole, the company is a gainer by it." That is one instance of what we object to. That would be pleaded continually before the shareholders; of course the shareholders are not behind the scenes, and cannot say that it is not so. There is also

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the instance of the West Hartlepool Company which has been so often before Parliament, and has been opposed. A Bill was brought in to legalise the losses already sustained by running steamers behind the backs of the House of Commons, but the House of Commons threw that Bill out, upon the opposition of the steamship owners and others, and of the shareholders themselves, who were thoroughly dissatisfied because large amounts had been frittered away in that way. They were perfectly certain that private enterprise would have provided all the steam shipping that was necessary. If these powers were granted, of course railway companies would in many instances have the chances of making three profits: a profit by land-carriage, a profit by sea-carriage, and a profit also by the dock dues paid to them when they were also the owners of the docks. And we consider that in the public interest such a change is not at all desirable, and that it would be bad for the public, because it would put an end to the trade which private owners have at present. And inasmuch as private enterprise supplies all the vessels that are wanted for the different ports, and wherever there is a trade, private enterprise is ready to meet it. The objection which was formerly raised does not apply now so much, because the owners running from one port to another are quite accustomed to making time charters, and to disposing of their property wherever a demand exists. We consider also that railway companies are constantly changing bodies (the shareholders change), and that they would not have the same knowledge of what should be done as private owners would have over their property. We also think that it is rather inconsistent, inasmuch as the Manchester, Sheffield, and Lincolnshire Company petitioned against the Great Eastern Bill of last year, upon the ground of its being contrary to public policy, that they should come before Parliament this year and try to get the same power. We consider that that is just an instance which proves that what the Mayor of Hull has said may be expected to take place. They would probably say this: the Great Eastern Company have got limited powers, for the powers of the Great Eastern Company were limited; they asked for more than Parliament gave them, and we therefore (that is, the Manchester, Sheffield, and Lincolnshire Company) come in quite a different character before Parliament this year. That is a pretty good proof that all the other railway companies would endeavour to do the same.

271. You would put it in this way, that if the company gets the power, the others would all endeavour to do the same?—Yes, no doubt of it, in self-defence. Our idea is, that railway companies should not hold sea-going vessels; that they should be prevented from doing so in the interests of the public, and of their own shareholders. We think that Parliament should put an end to this interference with a dangerous business; for certainly it is dangerous for them.

272. Is not that rather a question for the shareholders themselves than for Parliament?—No, I think not. It always depends upon the policy of the Board rather than the shareholders. The Board have large amounts of proxies at their disposal, and they take a great interest in these questions; so that, although there may be some dissentient shareholders, yet the Board always get their way unless something very flagrant is proved.

273. You put it apparently thus, that although the railway companies are popularly constituted, and the shareholders have full power over the directors, that is not practically the case?—Yes. All power is vested in the directors, and it may often happen that they have a policy and interest different from that of the shareholders in general; and inasmuch as the chairman would assure any one of the shareholders who ventured to get on his legs at the meeting, as in the case of the South Yorkshire, that there was a profit upon the whole, as the shareholders would have no chance of checking his assertion, and saying whether it was correct or not, therefore the result would be that the opposition would be futile.

274. Sir *Francis Goldsmid.*] With regard to the Manchester, Sheffield, and Lincolnshire Company, I wish to understand what you have stated; what is the trade that the Manchester, Sheffield, and Lincolnshire Company, you say, carry to their docks without any profit upon the docks, but merely with a profit upon the railway?—What I speak principally of is the coal trade, and the case which I gave was the case of vessels that may have discharged their inward cargoes at Hull; then of course, if they are left to the natural course of the traffic, they would load their outward cargoes at Hull also; instead of which, because the

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Manchester, Sheffield, and Lincolnshire Company give facilities, by not charging them dock dues, and so forth, they go to load at Grimsby, when they might just as easily load in Hull.

275. Does the Humber Agreement, as it is called, not apply to the coals with respect to sharing the profits?—That applies rather to the trade from the manufacturing districts.

276. Mr. *Algernon Egerton.*] Are you acquainted with the provisions of the Railways Clauses Act of last year?—I have seen them.

277. Do you know the 30th clause in that Act, by which railway companies are obliged to charge the same rates to all parties?—Yes.

278. Do you think that that is a sufficient protection in practice?—No, I think not; those clauses are constantly evaded, and the instance that I gave will prove it. I mean the case in which the companies compete at what they call equal rates, that is, making all the ports upon the east coast which belong to one system of railway, equal; and the effect of that is, that they are charging the same rate per ton for twice as many miles to the one port as to the other. That shows how the clause to which you refer can be and is evaded. It might be evaded also in another manner by giving returns such as commissions for collecting the traffic, and so on.

279. In point of fact, you consider that the railway companies can walk out of it?—Yes, in some behind-hand mode.

280. By the returns which you speak of?—Yes; by making returns which they might call a commission upon collecting the goods or anything else.

281. Do you believe that that is frequently done?—I believe so.

282. Have you any knowledge of your own upon that subject?—No; because my business does not lead me into matters of that sort. I cannot give instances, because I have no traffic of that sort to deal with, but it is a matter of common notoriety.

283. Mr. *Lygon.*] Did I rightly understand you to say that shipping was a distinct business of itself?—Yes. What I said was that those who were engaged in shipping ought to be devoted to its management in order to understand it thoroughly, and that it is the most dangerous business in existence for others to interfere with. For instance, take a Railway Board: I consider that it is far better for them to leave it to those who really understand the matter than that gentlemen who sit at the Board for other purposes should try to undertake it themselves.

284. Surely it is no great disadvantage to the shipping interests if gentlemen not understanding the business enter into competition with them?—I put the argument in this way: that it was not in the interest of the public that railway companies should interfere in the trade, because large sums of money would be lost. To support that, I gave instances in which large sums of money have been lost, such as the cases of the West Hartlepool Company, and the North of Europe Steam Company, which was, in fact, an emanation from railway interests in a great measure.

285. If shipping be, as you say, a distinct business in itself, will you explain how a greater distinction can be drawn between land carriage and sea carriage on the one hand, than between the conveyance of goods and their collection, warehousing, and distribution on the other hand? Are not the collecting, warehousing, and distributing of goods more distinct from the actual conveyance than land carriage is from sea carriage?—They are quite different businesses altogether. You do not find shipowners taking to land carriage; they do not understand land carriage generally; and what we object to is the same party having the command both of the land and the sea carriage. We say that that would result in a loss in a great measure to the public, and also the loss of a great amount of property to the shareholders, as it has done hitherto in many instances which are on record.

286. Mr. *Hodgson.*] Do you know the amount of tonnage that sails from and to the port of Hartlepool?—I see it always in the yearly returns, but I do not know it exactly.

287. If you do not know the details, you know generally that it is enormous, do you not?—Yes, it is a very large amount; I do not know the particulars. The principal articles are coals and coke outwards, and timber and deals inwards; that is what the principal trade consists of, although of course there is some corn, and there are some other matters.

288. Still are you aware that, looking back for 20 years, the tonnage has enormously increased?—Yes.

289. Do you think that it has been a benefit to the public at large or not that the port of Hartlepool should have been formed, and that ships should have come there and that that large tonnage should go in and out of that port?—I do not think that there is a particular benefit to the extent of that larger amount of business, because it is abstracted from the other ports, and is done sometimes by the merchants of other ports. For instance, speaking of Hartlepool and Hull together, the Hull merchants import into Hartlepool just as they do into Hull, upon the ground that the railway company have given such a rate that, in fact, the company charge just the same for double that distance in miles; therefore the Hull merchants are bound sometimes to send their goods there.

290. In point of fact, this is a case of Hull against Hartlepool this time?—No, I take it upon the general ground.

291. Your objection to Hartlepool is that it abstracts traffic that naturally would go, in your opinion, to Hull?—No; my objection is that the railway authorities put it upon an unfair competition with Hull, by carrying twice the distance from Hartlepool, at the same rate per ton as they do from Hull; that is another instance of the manner in which the railway companies would be likely to compete with us if they had steamships; that is not fair.

292. The public have the benefit of equal rates to Hartlepool, have they not? Do you call that a benefit or a disadvantage?—I think it is a disadvantage, because the public of the Hull district is larger than the public of the Hartlepool district; therefore, on the whole, it is a disadvantage.

293. If the public wants its goods consigned to any place to which they would go by sea from Hull, has not the public the opportunity of sending those goods there and getting them sent off as cheaply as by Hartlepool?—As cheaply per ton, but not per mile, because in going to Hartlepool the traffic from manufacturing towns is carried a greater number of miles as compared with Hull, the same rate being charged per ton; therefore the public are driven to send their goods that way which they otherwise would want to send to Hull. I have known many instances in my own trade of goods which had been actually intended for Hull having been compelled to be sent on to Hartlepool, at an inconvenience to the merchants, because the railway company made those unfair arrangements.

294. Taking a trader at Manchester, is it an advantage or a disadvantage to him that he should be enabled to send his goods to Hartlepool and to Hull at equal rates?—I do not see that it is an advantage to him, because if he wants to send his goods to Holland (say to Rotterdam), or to Hamburg, or to a port in the Baltic, it makes no difference to him which port he uses.

295. Perhaps you would go so far as to say that it is a disadvantage to him that he has the choice?—It is no advantage, because it might have gone the other way just as cheaply and just as safely.

296. Is it a disadvantage then that he should have the choice?—I could not say that it is a disadvantage, but it is no advantage to him, and it is an evil to others.

297. Does it not come to this, that it is a disadvantage to the port to which the traffic ought, as you think, to go, and that it is an advantage to the public to have the choice between the two ports?—I cannot see that it is an advantage to the public, because as long as the goods get from Manchester to Hamburg or St. Petersburg, there is no advantage in Hull and the people there being put to a disadvantage.

298. You object also, I think, to there being no dock dues charged at Grimsby; your own are very high, are they not?—My objection is that the railway company have the power to compete unfairly by letting go one of their profits because they happen to hold two profits, one in each hand; and they say, Rather than not get this business for our railway, which of right belongs to Hull, we will let go one of our profits, the dock dues at Grimsby, and secure the other; thereby diverting and not increasing the traffic, as a whole, because the ship would have taken the same amount of goods from the United Kingdom if they had let the traffic alone, and if the ship had loaded at her natural port, that is, where she discharged.

299. Do you think that it is a disadvantage to the public to be able to send

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goods to Grimsby, and to send vessels to load there, because the dock dues are very low there?—The dock dues are not very low when a ship comes to Grimsby in the ordinary course to discharge; they are not much lower than at other places.

300. Do you think that it is a disadvantage to the public to be able to send goods to be shipped at Grimsby, where the dock dues are lower?—I do not know of any case in which they are so much lower (for that is what the question comes to), than the rates in force at other docks in the North; there is not so much difference between them and our dock charges; they vary a little, but there is not much difference.

301. In some articles there is a difference, is there not?—Yes, a little.

302. In favour of Grimsby?—Yes.

303. Therefore that is an inducement to the public to send goods to be shipped at Grimsby, is it not?—My answer is, that the public sending goods have nothing to do with the dock dues; the dues are paid by the shipowner.

304. It is an inducement to the shipowner to go to Grimsby if the dues are small, is it not?—Yes, to the shipowner; but I say that he is ready to sail either way; he does not care which port he goes to.

305. If the dues are lower at Grimsby, it is an advantage to him, is it not?—Of course it is an advantage to him.

306. You appear to have a paternal regard for the shareholders of railway companies, and you are afraid that their capital may be applied to purposes to which Parliament did not mean it to be applied?—I have seen instances of that for some years past.

307. In the shipping trade?—Yes.

308. At Hartlepool?—Yes. There is also the South Yorkshire case; and, Session after Session, I have seen instances of that sort.

309. Do you think that it would be better that this capital should be illegally diverted, contrary to the purposes prescribed in the Acts of Parliament, or that Parliament should legalise its application, and that it should be applied within the provisions of Acts of Parliament?—I think it is so wrong a thing, whether it is done illegally or legally, that Parliament would be doing a great injustice, in the opinion not only of myself, and of shipowners generally, but of the mercantile community at large by sanctioning it, and I think Parliament will pause before it will do such an injustice.

310. You know that it is done by the Midland Railway at Morecambe?—I have heard so.

311. Do you know that it is done by more than one railway company at Fleetwood?—Whether it is or not——

312. I ask you whether you know that railway capital is diverted from its proper source at those ports; do you know it, or do you not?—I have heard that there are some diversions of that sort under peculiar circumstances, and granted as exceptional cases.

313. Do you believe that the guard which Parliament has established against its being done is at all efficient for the purpose?—I think not.

314. Do you think, then, that it would be better that Parliament should legalise the expenditure, or that it should be done underhand, and contrary to the provisions of the Acts, as at present?—I think that it would be decidedly objectionable that Parliament should legalise it. I think it would be much better if Parliament were to act as they did in the case of the Hartlepool Company, by throwing out the Bill, and refusing to legalise it, when, as in that case, the chairman wished to have it legalised.

315. Mr. *Hutt.*] You think that railway companies would not be likely to manage ships in a manner beneficial to the public, or advantageous to the shareholders?—Yes, I feel certain of that; I think that experience has shown it.

316. Do you know the steamships plying between Boulogne and Folkestone?—No.

317. You have heard of them, I presume?—Yes.

318. Do you know to whom they belong?—No.

319. Do they belong to a railway company?—That I cannot say.

320. Are there ships running on the same line belonging to private owners?—I cannot say, of my own knowledge.

321. Do you know whether they are well managed or not?—I believe they are.

322. Do you know the steamers plying between Holyhead and Dublin?—No; there are other witnesses who will give the particulars, as to those trades, more correctly perhaps than I could.

323. Mr. *Clay*.] I presume that the difficulty which you speak of in the management of shipping by any persons, except those who have been long and familiarly acquainted with it, does not apply, or at least not with so much force, to the mere carrying of passenger traffic, such as that between Dover and Folkestone, and between Holyhead and Kingstown?—No; of course, that is a different thing altogether; I mean the broad question, that which is raised by the Manchester, Sheffield, and Lincolnshire Company, namely, that they shall be ocean carriers; carry every thing, in fact.

324. You consider that if the powers for owning ports and steamboats, and so forth, are granted to one railway company running to a port, as a matter of necessity, for self-protection, another company running to the same port must ask for the same powers?—Yes; I have no doubt of it.

325. If Parliament should consider that it would be unjust to refuse to one company the powers which they had granted to another, and should therefore grant them; is it your opinion that the result would be the diversion of a very large portion of the shipowning trade to the railway companies?—Yes; I have no doubt of it.

326. And consequently a great diminution of the existing class of private shipowners?—There is no doubt of it. "The private shipowners must go to the wall," as a witness said upon the "Great Eastern" case last year. The railway companies must in the first instance scramble, and pull backwards and forwards, to get hold of the traffic; and when they have got the private owners out of the way, they will raise their rates, and the public will be damaged in that manner.

327. Do you think that that would be the case to a great extent?—I have no doubt of it.

328. Mr. *Pollard Urquhart*.] Do you not think that a company thoroughly familiar with the trade, competing with a company not so well acquainted with it, would have a great advantage?—No doubt.

329. Of course, the present shipowners thoroughly understand their business?—Yes.

330. You state, I think, that the railway directors do not understand their business?—Yes, as to shipping.

331. Then the shipowners can compete at a great advantage as against the railway companies; can they not?—No, because the enormous capital that the railway companies have, gives it the other way; for instance, you cannot find a steam-ship company, under ordinary circumstances, with one-tenth of the capital that those large railway companies have. Therefore we must consider at what rate a private owner can manage his business and attend to the interest of the public. He must finally succumb, because if he loses 10,000*l*. to 50,000*l*. a year, instead of making only the difference of a quarter per cent. upon his dividend, it is ruin to him. In the case of a limited liability company, they must show the loss, and the shareholders would say, "We must give up this trade; we cannot contend against so great a loss as this."

332. Are railway companies so utterly indifferent to the amount of their dividends as to consent to such a reduction as even a quarter per cent. for the purpose of ruining the ship companies?—It is not to ruin the ship companies exactly; it is to get the business into their own hands entirely, and to get more out of it afterwards when they have the monopoly, and when the private shipowners are driven out of it altogether; they look to repay themselves in the future, when the trade is at their mercy.

333. If I rightly understood you, you stated that they competed with great advantage, because the railway companies could forego one profit by having another?—Yes.

334. You can compete in that manner, too, can you not, because you might forego the advantage which you get upon one branch of your trade, falling back upon the profit which you make upon another; that is, supposing you have two trades?—We have only one trade, whereas the railway companies in such a case would have three trades: they own docks; they would own ships, and they are land carriers; and against that we have only one trade; therefore, if the railway companies say, "We will take two-thirds of our trades and run the

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steam traffic for nothing," they could still have the dock and the railway profits, and they would be cutting the throats of the private owners.

335. On the other hand, the private companies do bring to Hull and to other ports great additional traffic, do they not?—It is not additional traffic, on the whole; it is traffic that must come, and be carried by some means or other to the ports of shipment, in order to be taken away. The trains must bring those goods somehow or other, and the ships can only be full. The only question is, whether those ships are to be sent by the private owners, who now supply all that is necessary, or whether the railway companies are to take possession of the whole affair.

336. You get a larger traffic in consequence of the railways than if they did not exist, do you not?—Of course there has been a great development of business in consequence; that is the natural growth of trade, of course.

337. Has it not been improved by the improved means of the transit of goods?—If the goods came down by canal they would have to be shipped; the difference is as to the means by which they are brought.

338. You would not deny that you have a greater traffic at present than you would have if the goods came only by canals?—No doubt there has been a general growth of trade, assisted by the vastly improved means of transit by rail.

339. Could not you afford to accommodate that additional traffic which the railway companies bring you at a smaller profit?—I believe that in the present state of competition the thing is run as fine as it can be.

340. Do you think that the railway companies could not run it finer?—They could run it finer by running at a small loss, or by taking no profit, and compensating their dividend from other sources.

341. *Chairman.*] Do you wish to add anything to the evidence which you have given to the Committee?—I believe I have nothing to add.

Mr. *William Ferrier Kerr*, called in; and Examined.

Mr. *W. F. Kerr.*

342. *Chairman.*] I THINK you are a partner in the firm of the Glasgow Screw Steamship Company?—Yes, I am one of the partners.

343. Your steamships ply between Glasgow, Cork, and Waterford, and between Waterford and Cork?—Yes.

344. Do you also represent, in this room, Messrs. Cameron & Co.?—I am not here as representing the Messrs. Cameron, but merely to state that I know the Messrs. Cameron are large steamship owners, snd that I know they are strongly opposed to railway companies obtaining powers to own steam vessels, and that, but for illnes, Mr. Cameron would have been before the Committee to give evidence.

345. Between what ports do they run?—Between Glasgow and Londonderry, Belfast and Sligo, between Morecambe and Belfast, and Sligo and Liverpool.

346. Mr. *Hodgson.*] Are those Mr. Cameron's boats?—Yes.

347. *Chairman.*] How often as a rule do your steamers sail from each port?—Our own steamers sail twice a week each, but Mr. Cameron's much more frequently; three times, I think.

348. How often does the Londonderry and Morecambe boat sail?—She goes once a week, I think.

349. Between Morecambe and Belfast, how often is it?—There is a steamer daily, and between Glasgow and Londonderry, they go about three times a week from each end.

350. I need not ask whether there is a very large capital embarked in the trade of steam conveyance between Scotland and the West of England and Ireland?—Yes, there is a very large capital; I can speak more of the south of Ireland where my traffic lies.

351. Can you tell us anything as to the direction of the traffic between the south of Ireland and Scotland?—From the south of Ireland a great quantity of our traffic comes by railway from up the country, and the same in Scotland; it goes from Glasgow to the principal central places in the south of Scotland, and the principal towns generally in Scotland.

352. Most of that traffic is carried by the steamers trading between Glasgow and the Irish ports, is it not?—Yes, all of it is; it must go by steamer.

353. What ports does the Scotch traffic go to?—Belfast, Dublin, Londonderry, Sligo, Waterford, and Cork.

354. On the other hand, is there a traffic from the north and east of Glasgow, and from the country inland of Glasgow generally, which comes down either to Glasgow or Greenock by railway, and is shipped either at Glasgow or Greenock for Ireland?—Yes, a very large trade comes down from the places both north and east of Glasgow, as far as Aberdeen.

355. I suppose this question of the power to own steamers being conferred upon railway companies, has been a good deal discussed in the mercantile world with you?—It has a good deal.

356. Probably you have had a good many opportunities of ascertaining the opinion of commercial men upon it?—Yes, the general opinion of commercial men, that is the opinion of commercial men altogether having nothing to do with steamers, is against railway companies having those powers, and I think very justly.

357. Can you give us your reasons for objecting to these powers being conferred?—I think one very patent objection is, that as soon as a railway company has done what they would eventually do, namely, run off all private companies, it would have the monopoly. Already they have at present the monopoly of the land traffic, and by running off the private companies they will have a monopoly of the sea traffic, and then of course they would raise the rates. There could be no fear of the rates ever being raised so high by private companies as they would raise them, because there are plenty of other private companies who if we raise them too high will come in and oppose us; that is a very fair thing.

358. You put it upon this ground that they have virtually a monopoly of the land carriage, and have, therefore, a greater income upon which they can fall back to cover the losses they might incur in setting up steam vessels?—Certainly they would do so.

359. I presume you would not object merely upon the ground of their having a larger capital?—No; I may mention that we have a large through booking system done by the clearing-house in Ireland; it works as well as any system could possibly work; there is no trouble, and it satisfies the public quite as well as if the railway company had it all in their own hands, better in fact, because the rates are lower.

360. Have you at all considered the question, whether railway companies owning steamers would be likely to divert traffic to their own lines?—They would do so.

361. They would of course have the control of the land traffic?—They would certainly have the control of the land traffic. The only competition that there could be between private steam shipowners and railway companies, would be between the port of departure of those steamers and the port of arrival, rather than at any terminus up the country, because while they had the goods conveyed by land traffic, a ship company could not compete for the traffic, a great part of our traffic does come from such inland termini.

362. Are you acquainted with the provisions contained in the Railway Clauses Act of last year?—Yes, I have read them; those refer more particularly to passengers, but I suppose goods are intended to be included.

363. Will you read the 30th clause?—"Where a railway company, incorporated either before or after the passing of this Act, is authorised, by a special Act hereafter passed and incorporating this part of this Act, to build, or buy, or hire, and to use, maintain, and work, or to enter into arrangements for using, maintaining, or working steam-vessels for the purpose of carrying on a communication between any towns or ports, and to take tolls in respect of such steam-vessels, then and in every such case tolls shall be at all times charged to all persons equally, and after the same rate in respect of passengers conveyed in a like vessel passing between the same places under like circumstances; and no reduction or advance in the tolls shall be made in favour of or against any person using the steam-vessels in consequence of his having travelled or being about to travel on the whole or any part of the company's railway, or not having travelled or not being about to travel on any part thereof; or in favour of or against any person using the railway in consequence of his having used or being about to use, or his not having used or not being about to use, the steam-vessel. And where an aggregate sum is charged by the company for conveyance of a passenger by a steam-vessel and on the railway, the ticket shall have

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the amount of toll charged for conveyance by the steam-vessel distinguished from the amount charged for conveyance on the railway."

364. Is it your opinion that the provisions are effectual for the object for which they were intended?—No, I think not.

365. Can you point out any means by which they could be evaded?—A railway company could give returns and bonuses in one form or another; they could make special arrangements.

366. If that were known would not that be a violation of the Act?—It is almost impossible for it to be known, because there are many ways of preventing its being known.

367. Special arrangements are allowed to be made by the companies?—Yes; where there is a through booking system they must have special arrangements.

368. Even if a system of through rates were adopted, would it be in the power of the company to impose a rate to drive off the traders?—Yes, they could reduce the rate to almost nothing by the steamers; because they have the rates upon the land carriage, and so they would cut us out of having any profit.

369. I think I understand you to say that as far as unity of management is concerned, and as far as the advantage of having one payment goes, the present system gives every advantage in those respects?—Yes, the through booking system gives it perfectly.

370. Is there anything else that you wish to add to your evidence?—I think not; I know myself as an individual that if railway companies were putting on steamers in opposition to us, I should think myself very foolish if I did not withdraw as soon as possible; I should certainly lose all I had.

371. You would retire from the business?—Certainly I would.

372. Mr. *Kinnaird.*] Is there a Chamber of Commerce at Glasgow?—There is.

373. Have they ever discussed or taken any part in reference to this question?—I am not aware of their having done so.

374. Have you any Scotch railway company that has the steamboat powers?—The only railway that I know of as having them, is the Edinburgh, Perth, and Dundee Railway; and that is not exactly a steamboat power, it is across the Firth.

375. It is more in the nature of a ferry?—Yes, it is rather a ferry.

376. You do not know of any other Scotch railway that has those powers?—No.

377. There is therefore no case in point of any shipping interest being damaged or being driven off by such a power?—There is no case in Scotland because there is no railway having power to do so. The Glasgow and South Western Company attempted to get such powers but they did not get them.

378. Who combined to resist them?—All the shipowners, because it is a precedent; if one railway gets them another will soon follow.

379. You believe that the general feeling is that such powers should not be given?—Yes, I think that it is the public feeling, because they know that monopoly will always raise the rates; monopolies are never good at any time.

380. Mr. *Hodgson.*] Last year when some of those railway companies applied for powers to own steamboats, there was a considerable opposition against the measure, was not there?—There was.

381. There were deputations to the Board of Trade, were there not?—Yes; I took no leading interest in last year's proceedings in London.

382. Can you tell me whether the public took any part at that time against the measure giving railway companies power to establish steamboats?—I do not know that they made any active opposition; the steamboat owners did so as a matter of course.

383. I ask whether the public took active steps?—I do not know that they took any active steps.

384. The inference is, is it not, that the public did not object to the measure?—I know that the public do object to it; I know that I have heard people saying so; that is, interested parties, who have their goods carried, and so on. They have said, We know that if your steamers go off, and if it is left to the railway companies, there being no other means we shall have to pay more.

385. Is

385. Is it within your knowledge that the steamboat owners did make active opposition?—Yes.

386. You are not aware that the public made such active opposition?—No.

387. Is there any competition between the steamboat companies themselves?—There is competition between the private steamboat companies.

388. What is the result of that?—The result is generaliy that the smallest company very often retires or opens up another field, if it cannot carry on the trade.

389. What is the general result finally?—The result is that they just go on in that way.

390. Is there a rise in the rates?—No, we do not raise them. We had an opposition started against us after we started; it very soon retired, but we kept our rates the same; we did not raise them. We are to some extent kept in check by the Great Southern and Western of Ireland, which, before we started steamers, charged an immense freight from Glasgow to Cork; now the rates are reduced to the same as ours; but if the trade were in the hands of the railway company entirely, the public in Cork would again require to pay very high rates; even now the railway company charge about 7*s.* per ton more for some goods (for example, sugar) from Dublin to Cork than they charge for the same article from Glasgow to Cork; and out of that rate the railway company has fully two miles of cartage to pay in Dublin from the steamer to their station.

391. Why do you assume that railway companies when they had driven off the private companies, would raise their rates when that is not the case after a competition between the steam-packet companies?—Because if we run off another company, and begin to raise our rates too high, there will be other private companies that will make us reduce them again. It is different with regard to railways. No private company can ever think of going in to compete with them, because they not only have a large capital, but they have the control of the traffic; they have the land traffic.

292. Supposing Parliament should make a provision that railway companies should not charge unfair rates as between their own vessels and other vessels, would that be any protection to private owners?—You mean, I apprehend, by fixing a minimum charge between the ports.

393. I mean by dividing the through rate, that the sea passage and the land passage should be divided, and by providing that the land rate should not be above a certain amount, and that whatever was charged for sea rates on the company's own vessels, no more should be charged against the public, or against other shipowers?—We could not compete at all except for local traffic from one port to the other, because the railway rates are specially arranged. We have no chance of getting an inland cargo, because the railway companies can give back bonuses and things of that sort to other companies (and that is often done) to send them goods.

394. Would not that be committing a fraud upon the Act?—There is always a way of doing those things. I know that it is done.

395. It could not be done legally, could it?—I think not.

396. Speaking now of through rates for passengers, do you mean the Committee to understand that you think that by special arrangements a railway company could pass by the provisions of the Act of Parliament, and convey their passengers at a different rate from that which Parliament has provided in the case of individual passengers?—In passengers there is not so much room for these evasions as in goods.

397. You were speaking of passengers at the time when you mentioned this before, were you not?—My trade in passengers is so small that I have not allowed it to influence me in my remarks.

398. Do you think that in respect to a passenger a railway company could by a special arrangement alter the rate at which that passenger is to be carried, departing from the provisions of the Act of Parliament?—So far as Parliament has fixed any rate for passengers, they could not go above that rate.

399. Has not Parliament fixed the rate chargeable by a railway company, as compared with the rate charged by railway companies and steamboat companies together?—I believe that was done last year.

400. I want to know whether by special agreement a railway company could defeat that clause, and make a distinction which Parliament says should not be made?—I think not, legally.

Mr. *W. F. Kerr.*

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401. You represent, do you not, the steam packet company that plies between Morecombe and Belfast?—I do not represent that company. I said that Mr. Cameron was coming here if he had not been indisposed and laid up with illness. I know that his firm run such steamers, but they are not ours.

402. You cannot tell, perhaps, whether that steamboat company is subsidised by a railway company?—I do not know.

403. Supposing that there be a port having traffic, whence no steam-vessels run, and that no steam-packet company, or individual owner of steam-packets, chooses to establish vessels, notwithstanding that there is such a traffic as would induce a railway company to establish steam packets from that port, should you object to the railway company having power to do so?—I cannot fancy such a case, because we steamboat owners are looking out for places to do business, and if we see a port where we can make a trade, we always try it.

404. I ask you, as representing steamship societies, whether, supposing such a case to exist, you would object to the powers being granted?—I can hardly fancy such a case occurring.

405. I put the question to you, of a railway running to a port which had no steamboats plying to it, and a railway company being ready to put on steamboats, would you in that case say that the railway company ought not to have the power of putting on steamboats?—It is a case which I cannot fancy occurring.

406. Can you imagine the case if I put it to you?—It would be a great stretch of imagination for me to fancy a railway coming to a port which had a trade, and where there was no private shipowner to take it up.

407. Will you exercise your imagination; as an owner of steam-ships, would you object to that power being granted?—Very probably it might be expedient if a steamboat company refused to put on steamers.

408. Then you would give the railway company the powers?—If such a thing occurred, I do not think it would be objectionable; but such a thing, I think, could not occur.

409. I put it to you, if it did occur?—I cannot answer what I think an impossibility.

410. Do you consider that your steam packet company would establish a steamboat wherever they were asked to do so?—If we saw any chance of making a trade we should. We all expect in starting a trade to lose at first, for some time; but if it would eventually answer, we should certainly try it.

411. If you thought that there was no chance of a trade, and the railway company thought that there was a chance, would you deny to them the power to try it?—If the railway company thought there was a chance, I think a private company would be more anxious still to try it. If a railway company were to come to us and say, "We think there is a trade to be done here; if you do not undertake it then we will apply for power to take it up:" we should say, "What inducement do you hold out to us; give us proof of the probability of such a trade and we will try it."

412. Supposing that your opinions were adverse, and that you thought that there would not be a trade sufficient to remunerate you, would you then prevent others from trying it?—Supposing I was very cautious, and did not want to go into it without being sure of doing something in the trade, still some other steam packet company might go into it.

413. Supposing that all the steam packet companies refused, would you, as representing the steam interest here, prevent the railway companies from having the power of putting on steamboats?—I cannot fancy such a case occurring.

414. You can surely imagine such a case?—I think it is beyond imagination, because the steam packet companies are so anxious to get and to find employment for their vessels.

415. I put the case to you hypothetically, will you answer it?—I cannot fancy such a case.

416. I put it to you thus: there is a port, there is a railway going to the port; the railway company think that there is a possibility of finding a trade for steamboats; the steamboat companies refuse to put the boats on that station, would you then refuse the power to the railway company of doing so?—Where such cases occur, I should not so much object to companies having the power.

417. Representing the steamboat companies, you would not object to the powers

powers being granted in such a case?—For my own part I should not object so strongly to such a case, if such case did occur. Mr. *W. F. Kerr.* 9 March 1864.

418. Mr. *Clay.*] Practically your answer to that supposed case, of a place with a trade and without ships, is, that either you, or somebody else, would send ships there directly, is it not?—Yes, if there is a possibility of a trade being made.

419. Have you any ships that have sailed to Londonderry or Belfast?—No, our ships go to the south of Ireland.

420. Mr. *Pollard Urquhart.*] Are the railway companies generally anxious to run their own steamers in cases where the existing ship companies are willing to enter into reasonable arrangements with respect to the through traffic?—We have never found them otherwise than ready to book through; we do through book from many places in Ireland to Glasgow, and the railway company are perfectly satisfied with the way in which we conduct the arrangements; the public are thoroughly satisfied, and there would be no difficuly in through booking by private steamboat companies to any place.

421. If the railway companies had the powers granted to them they would not try to avail themselves of them, except where the existing companies would not enter into arrangements about the traffic, would they?—They would wish to get the whole of it.

422. I understood you to state that where the steam companies were willing to enter into reasonable arrangements about through traffic, the railway companies do not wish to run their own steamers?—The company with whom we through book is content.

423. You do not think, I suppose that, under any circumstances, a railway company, in the South of Ireland, would wish to run their own steamers?—I do not see why they should get the power.

424. You do the business as well as they could themselves?—Probably better.

425. Have you entered into arrangements with any Scotch railway companies for through traffic?—Only one, the Edinburgh and Glasgow Company.

426. Do you think that there is a want of convenience on account of the through traffic at Glasgow?—Not at all, because we are anxious to make a through traffic wherever we can; and wherever there is a chance of increasing trade we do so.

427. You have no agreement with the Glasgow, Perth, and Aberdeen Company, have you?—No.

428. Do not you think that that occasions some inconvenience to the public, when passengers want to go through?—I speak rather of the cargo, because we carry very few passengers; our traffic is chiefly in cargo; but we make through rates as far as ever we possibly can with the railway companies.

429. Do you do so in the North of Scotland?—No, only with the Edinburgh and Glasgow Company in Scotland.

430. If the railway companies, in the North of Scotland, had facilities for running steamers wherever they wanted, do you not think that that would make your companies anxious to enter into arrangements with the railways?—We are always perfectly ready and anxious to do so; the bulk of our trade is through booking in Ireland; most of our cargo from Ireland comes down the country, from the interior; in Scotland a large portion of it does so, but not at all so large a portion as in Ireland.

431. *Chairman.*] Is there anything that you wish to add to the evidence you have given?—No.

Anthony George Robinson, Esq., called in; and Examined.

432. *Chairman.*] I THINK you are a Steam-ship Owner and Agent in London?—Yes. *A. G. Robinson*, Esq.

433. Do you manage the steam-vessels belonging to the Messrs. Malcolmson?—Yes.

434. Are they among the largest of steam-ship owners in England?—Yes; they own rather more than 30,000 tons of steam shipping.

435. Where do those ships run, for the most part?—They run from here to the Baltic, to Holland, to France, to the Mediterranean and the Black Sea; to America and to South America, and from Liverpool to the River Plate.

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436. Was there, previously to the year 1857, a company called the North of Europe Steam Packet Company, which ran a line between Lowestoft and the harbour of Tönning, in Denmark?—Yes, there was such a company.

437. And there was another line between the Humber and Gottenburg?—Yes.

438. Those belonged to the same company, did they not?—Yes, to the same company.

439. Did that trade succeed or not?—No, it was a failure; the company became bankrupt, and an immense sum of money was lost.

440. The capital was entirely lost, was it not?—Yes.

441. Before the total failure of the company, did they abandon the trade between Lowestoft and the Netherlands?—Yes.

442. Was it found that any advantage was obtained in the cattle trade by sending the cattle to Lowestoft, instead of to London?—No, the direct route gradually got the preference; when there came to be an even competition, the direct route got the preference.

443. When that company fell to the ground, in what trade were the vessels employed?—They were sold to different parties, and some of them, those vessels which were specially employed in the cattle trade, were purchased by some of the shippers and importers of the cattle, and they were then employed in the trade between London and Tönning, and they have remained in the same trade since. The other ships were scattered all about; some were sold to foreigners, and to different parties.

444. Did the firm with which you are connected, at any time think of establishing direct steamers upon this line between Lowestoft and Tönning?—Yes.

445. I suppose the inducement was the comparative shortness of the sea passage?—Yes.

446. What were those vessels intended for mainly, passengers or goods?—Cattle mainly; that was the only trade in fact with that part of the world.

447. At that time had the Eastern Counties Railway Company any line of their own?—No, they were closely connected with the North of Europe Company, and were running in conjunction with them.

448. But without any formal co-operation?—Without any formal Parliamentary powers or anything of that sort.

449. Did you, at the time when you thought of establishing the line of steamers you have spoken of, communicate your intention to the secretary of the Eastern Counties Company and ask him to fix rates?—Yes.

450. Rates for cattle especially?—Yes; I wrote to the secretary to say that we had it in contemplation to use our steamers in the trade, and I asked him if he would put us on the same footing as the North of Europe Company.

451. Without going into the details, did you receive an answer from him, naming rates which you considered higher than those charged to the North of Europe Company?—Yes; they were more than double the rates at which I was told by some of the people connected with the Eastern Counties that they carried for the other line; in fact, although the secretary quoted 12 *s.* a head for cattle to me, I was told that they carried them for them at 4*s.* 6*d.* a head; that came from a party who had access to their books.

452. I believe you had some negotiation with the railway company, and the end of it was that they refused to carry your cattle at the same rates as those of the North of Europe Company?—Yes. The secretary said at last that I had better see the then chairman, Mr. Waddington. I saw Mr. Waddington two or three times, and had a good deal of conversation with him. The end of it was that he said this: "The fact is, Mr. Robinson, we cannot accommodate you; the harbour of Lowestoft is not large enough; we cannot provide trucks either." So he said, "We will not carry at the same rates for you."

453. Did you understand, from what he said, that the company did not desire to encourage any other traffic besides that carried by the North of Europe Company?—Yes; he led me plainly to understand that he did not want me there at all, nor anybody else.

454. Sir *Francis Goldsmid.*] Was the North of Europe Company, which was then in connexion with them, the company that afterwards failed?—Yes. Sir Morton Peto was a large shareholder, and a good many of the railway people were interested in it.

455. *Chairman.*]

455. *Chairman.*] It was in 1853, I think, that you carried on these negotiations with the Eastern Counties' Railway Company?—Yes, it was in 1853.

456. Seven or eight years after that, in 1860 or 1861, was there an experimental steamer started between Harwich and Rotterdam?—Yes.

457. For goods and passengers both? — Yes, for goods and passengers both.

458 By whom was that started?—It was started by the Eastern Counties' Railway Company, or rather by parties connected with them and under their wing.

459. Was it withdrawn?—It was.

460. After how long?—They ran for, I think, a period of two or three years, not consecutively, but they ran during the summer months.

461. Mr. *Hodgson.*] From and to which ports?—Harwich and Rotterdam.

462. *Chairman.*] I apprehend that your firm looked into that matter, and you considered that there was no prospect of a paying business?—Yes, there was no trade between those places.

463. Did you hear the evidence which was given before a Committee of the House of Commons upon the Great Eastern Bill of last year?—Yes, in both the House of Lords and the House of Commons.

464. Was it there stated by a witness, Mr. Forbes, that the Great Eastern Railway Company wanted steamboat power in order to get rid of the enormous charges in London and Rotterdam, and that no private company would join them in doing it?—Yes.

465. Had you been in negotiation with any parties for the purpose of doing that very thing?—Yes, for some considerable time, during the time that the Dutch Rhenish Railway was being made (for they first made a part only of the line), and afterwards, when they got the line finished, to connect with the German Railway Companies. I had from time to time conversations with their manager here, saying that I was desirous of entering into an arrangement for providing steamboats to start from Rotterdam, in order to facilitate the forwarding of goods into the interior of Germany, and to do away with the local charges both here and there. He told me at last, "Now the only man you have to deal with is Mr. Forbes." Upon that, I went over to Holland, and went to Utrecht, and there met Mr. Forbes, and had a good deal of conversation with him. He said to me, "The time has not come for an arrangement of that sort; when it comes, I will communicate with you," the fact being that he had not made traffic arrangements with the German Railways at the time. He said, "When the time comes, I will communicate with you," and afterwards I never heard a word from him; and to my great astonishment I heard him give evidence before Committees of both the House of Lords and the House of Commons, and say that he could not get anybody to undertake the thing. I distinctly told him myself that I would do it, and that I was anxious to get rid of these local charges at Rotterdam, as well as the charges here, in order to encourage the trade; although we have ships running to Holland, they are very seldom full; we are therefore anxious to increase the traffic. We have plenty of tonnage of vessels to supply them with.

466. You cite that I presume as an instance of a claim being made for powers by a railway company, upon the ground that no one else can be found to undertake the duties which they propose to undertake; whereas in fact private persons are willing to do so?—Yes.

467. You are the agent of an independent steam ship company, are you not? Yes.

468. Had you at one time, in conjunction with the Bristol Company, through booking arrangements with the Great Western Company?—We had.

469. At what date was that?—It was from 1853 to 1857.

470. Upon the South Wales Railway being opened, were steamers placed upon the line between Milford and Waterford?—They were.

471. To whom did those steamers belong?—They belonged to a private company—private parties subsidised by the South Wales and the Great Western Railway Companies.

472. So that, in point of fact, they were to some extent the property of the Great Western Company?—Yes, they had a traffic arrangement with them, by which they guaranteed them a certain sum per annum.

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473. Upon that line being opened, did the Great Western Company refuse to continue the through booking arrangements with you?—Yes.

474. Evidently with a view to give the preference to the line with which they were themselves connected?—Yes; at the time when we had through booking arrangements we carried a passenger from Waterford to London by steamer to Bristol, and by first-class carriage to London, for 31 *s.* 4 *d.*, and a second-class passenger in a first-class cabin for 28 *s.* 6 *d.*, and a third-class passenger, a deck passenger, for 24 *s.* 6 *d.*, and we carried bacon at the low rate of 32 *s.*, the Milford rate at the time being for bacon 35 *s.* The passenger rate by the same route, was 50 *s.* for the cabin and first class, and 46 *s.* for the cabin and second class, the single ticket. The Great Western at that time carried our bacon for us at 20 *s.* a ton, including delivery here. They then put the rate up; the rate at present is 27 *s.* 6 *d.* from Bristol; the rate at present from Waterford to London by way of Milford is 30 *s.* Bacon is one of the principal articles that come from Waterford to London, and we carried in one year 1,200 tons odd by way of Bristol; in another year 1,300 odd tons; now we carry none at all.

475. I presume you had no power to enforce the continuance of through booking arrangements, and to prevent the refusal of the renewal of them?—No; the company refused it; and although we had advertisements out, and we could not withdraw the advertisements, they made it a great favour that they would carry the traffic, until the time expired, but beyond that they would not go.

476. Are you prepared to prove that, if there should be any dispute as to the facts?—Yes, I am quite prepared to prove that.

477. I think you object generally to the possession of powers by railway companies to own sea-going steamers?—Yes.

478. Have you heard the evidence of former witnesses?—Not to-day.

479. Will you just state briefly your grounds of objection?—That it virtually becomes a monopoly of the sea traffic altogether; it must become so; I will instance to the Committee the working of the thing at present. The Great Eastern Railway Company got last year steamboat powers to run steamboats between Harwich, Rotterdam, and Antwerp. They have not commenced running to Antwerp yet, but they have to Rotterdam, and they compete with the direct route; they carry goods, coffee, for instance, of which I have a bill of lading of their's here, at the through rate of 9 *s.* a ton from London to Rotterdam; their local charge from London to Harwich for coffee being 12 *s.* 6 *d.* a ton; they carry oil at 8 *s.* a ton.

480. Mr. *Pollard Urquhart.*] From where?—From London to Rotterdam; they charge from London to Harwich 10 *s.*, whereas they only charge 8 *s.* to Rotterdam. I live in Essex, within two or three miles of Romford, and I have a farm there; they charge me for carrying guano from London, from the Victoria Docks to Romford, which is 12 miles, 6 *s.* 3 *d.* a ton; they charge me 5 *s.* 9 *d.* a ton for oil cake. They take goods from London to Rotterdam down to Harwich, which is 68 miles, and across by steamer, 120 or 130 miles, for 8 *s.* for oil, and 10 *s.* for guano; and they charge me, for 12 miles, 5 *s.* 9 *d.* and 6 *s.* 3 *d.*

481. Mr. *Adair.*] The one is oil and the other is guano, is it not?—They take the guano for rather less; they take the guano for 10 *s.* a ton, and the oil for 8 *s.*

482. *Chairman.*] Do you cite that as an instance of traffic being diverted by the railway company's charging unequal rates for equal distances?—No; only that if you grant the power to a railway company to own seagoing steamers they compete with the present steamers in a ruinous way, by reducing the rates to what I instanced to the Committee. They run the steamboats off, and then it becomes a monopoly; they charge what they like. When they have got the power into their own hands they will not allow anybody else to run. I have another case which I may mention. Some friends of mine are agents for a line of German New York steamers, calling at Southampton; they carry a good many goods from London and from Havre; they have had great difficulty in getting the goods over from Havre, the only steamship company plying to that port being a railway company. They applied lately to the railway company (I know this because they have spoken to me more than once, asking if I would go into the matter), saying that if they could make the arrangements with

with the railway company they would. They said, "We have it in contemplation to put on a steamboat or steamboats, mainly to do our own trade, to bring over the New York goods for the German steamers; will you (the railway company) carry the goods to and from Southampton and London on the same terms that you do for your own boats?" They did not reply to that application. It was, of course, made first to the manager, and then it was made to the directors. Then the manager said to them, "I know of your letter to the directors; you will get no answer to that; I will take care that you get no answer at all."

483. Mr. *Hodgson.*] Who said that?—The South Western Company's manager.

484. What is his name?—Mr. Scott. So that we are shut out of our Waterford and Bristol trade, because the Great Western Company will not book through with us. We are just in the same difficulty everywhere else. The railway companies will put on board their own boats the goods which they have to carry. I think myself, as an Essex farmer, that I ought not to be charged what I am; so that we actually have goods carried to Harwich at a little over the rate which I am charged for 12 miles. If they can afford to carry such goods as guano from London to Harwich and Rotterdam at 10 *s.*, they ought to afford to charge me a lower rate for 12 miles.

485. *Chairman.*] Do you complain that they carry some goods below what you consider the proper price, or that they carry other goods above that price?—As a steamboat agent I complain that they carry steamboat goods at a great deal less than they can afford to do, in order to beat me off; and I complain, as a farmer, of their making me pay more than I ought to pay.

486. You connect the two grounds of complaint, the one with the other; you say that they are compelled to charge higher prices than they ought to charge upon the line in general, because in order to secure a practical monopoly upon the sea-going traffic, they are obliged to charge less than is remunerative upon another branch of their trade?—Yes.

487. Mr. *Adair.*] What is your freight for coffee from London to Rotterdam?—8 *s.*

488. And what is your freight for cocoa?—It is about 9 *s.* or 10 *s.* I think.

489. Mr. *Algernon Egerton.*] Will you refer to clause 30 of the Railways' Clauses Act of last year with regard especially to passenger traffic?—I am aware of it.

490. Supposing that there was a clause of a similar character with regard to goods, would it be any protection to a steamboat owner sailing steamboats from a port belonging to a railway company, in your opinion?—It would not be fairly carried out; you could not get them to do it.

491. You think that the company would find means of evading such a clause?—Yes, they would evade it, and having the monopoly of the land traffic they would put the goods from the land into their own boats. Besides that, the railways have a fund that they can apply so that no one, not even an accountant, could tell to what account the item was charged. Thus they can subsidise a company to carry at lower rates, and no one can ascertain it.

492. Can you explain how that can be done?—I could not explain how the railway companies keep their accounts: it would puzzle themselves sometimes.

493. You stated that you thought that they could give facilities to their own boats in discharging and loading, as I understood you?—We know that the railway companies have given money, and it has never been able to be traced.

494. In fact, you think they could walk out of any such a clause?—They can; I think there was a restraining clause put in by Mr. Cardwell, in the Act which he passed, that they were to carry at equal rates under similar circumstances. Now, here they are charging me from London to Harwich, if I send down casks of coffee, 12 *s.* 6 *d.* a ton; how could that be in accordance with the Act of Parliament when they would carry the same coffee to Harwich, and over by steamer to Rotterdam, at 9 *s.* a ton; I suppose they say that is not Harwich coffee; it is Rotterdam coffee, although their railway only goes to Harwich.

495. Mr. *Adair.*] Have you a steamboat running to Rotterdam from Harwich?—No.

496. Have you ever tried to get the Great Eastern Company to convey coffee for you from London to Rotterdam, by any other means than by their own vessels, and been charged a higher rate than they charge by their own vessels?—No.

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497. What is your complaint? Is it that you pay a higher rate from London to Harwich, than is paid from London to Rotterdam?—Yes.

498. Is there competition from other quarters between London to Rotterdam?—As a Harwich man, I have nothing to do with that competition.

499. Do you know whether there is or is not competition by sea from London to Rotterdam against the Great Eastern Company's steamers going to Rotterdam?—Yes.

500. Does not that explain at once why the through rate to Rotterdam is higher than that to Harwich?—Perfectly.

501. Is there anything to complain of in that?—There is everything to complain of.

502. Is the 12 *s.* 6 *d.* per ton which you pay for coffee above the rate that the Great Eastern Company are empowered charge for carriage?—I think not.

503. They are within the law?—Yes.

504. What you complain of is, not that they charge you more than they have a right to charge from London to Harwich, but that they charge less than they have a right to charge from London to Rotterdam?—Yes.

505. Do you call that dealing unequally?—Yes; I think when railways were first established the intention of Parliament was to put every one on the same footing: they said, "We are giving you a monopoly of a line; you are to carry for John at the same rate as you will for Dick and Harry; you are not to charge the one 12 *s.* 6 *d.* and the other 8 *s.* They take such powers under their Acts that they are, generally speaking, all within their powers as regards the charging of rates.

506. You do not allege that they charge Dick 12 *s.* 6 *d.* from London to Rotterdam, and Tom 8 *s.* from London to Rotterdam. On the contrary, they charge all alike, from London to Rotterdam 8 *s.*?—I believe so. They charge what they can; they charge one 8 *s.* and another 9 *s.*

507. You spoke of differential rates charged between Harwich and Rotterdam a long time ago, by means of parties owning vessels, who were under the wing of the Eastern Counties' Company?—Yes, from Harwich to Rotterdam.

508. What do you mean by parties "being under the wing" of the Eastern Counties' Company?—They were parties connected with them.

509. In what manner:—As directors, I think.

510. Did the company subsidise those parties?—I think so; certainly they did; because in one of their reports I saw they reported to their shareholders that there was a loss of some thousand pounds upon the line. I think they went further, and stated that they did not recommend its continuance.

511. Was that done under Parliamentary power?—No.

512. Then the absence of Parliamentary power does not prevent its being done?—No.

513. If it be done at all, will it not be better that it should be done under the supervision of Parliament and under an Act of Parliament?—I think not; because it is open to the shareholders to prevent them; a proceeding in Chancery would prevent them. That is a very expensive and roundabout way, but it can be done.

514. Practically, you find that it is done without Parliamentary power, do you not?—Yes.

515. Did I rightly understand you to say that the North of Europe Company was the same as the Eastern Counties' Company?—No, the North of Europe Steam Packet Company was an independent company.

516. They charged differential rates, that is, different rates to one person from what they charged to another under the same circumstances, did they not?—No.

517. What was your complaint against the North of Europe Steam Packet Company?—Nothing against the North of Europe Company. My complaint was that the Eastern Counties' Company, having a traffic arrangement with the North of Europe Company, declined to have anything to say to me.

518. They did not carry for you upon the same terms as for the North of Europe Company; was that your complaint?—They told me that they would not take my goods because the harbour of Lowestoft was not large enough, and because they could not find trucks; in fact, they did not want me.

519. Still the North of Europe Steam Packet Company was not a railway company?—No, it was in conjunction with them; it was got up to assist the Eastern

Eastern Counties' Company, and to promote traffic for them. I think it was got up by Sir Morton Peto. *A. G. Robinson, Esq.*

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520. If Parliament, in giving powers to railway companies to hold steamboats, were to compel the companies to make through rates between one point and another, and to divide the rate between the sea rate and the land rate, and were to compel the railway company to give any other steamboat proprietors a proportionate rate to the sea rate which they charged themselves, would that be a protection to the public and to the steamboat owners?—To a certain extent; but in consequence of the railway company having the land carriage in their hands, you are at their mercy. They can do as they like; for instance, supposing my steamer is to sail from Harwich to Rotterdam to-morrow morning and theirs at same time, they will take care to have their goods in time, and mine may be left half way, shunted at Manningtree, perhaps.

521. Do you think that any statutory provision would meet that case?—None.

522. Do you think that that would be treating all parties alike?—Yes; they would say so, at least.

523. *Chairman.*] Would there be any possibility of providing design in such cases?—It would be quite impossible; they might put a good engine to their goods and a bad one to mine, and that could not be proved.

524. Mr. *Hodgson.*] Do you think they would do that every day in the week?—Yes, every day, and 20 times a day.

525. Do you really believe that?—I do.

526. Do you believe that there would be no possibility of proving fraud against them in such a case?—I do.

527. Mr. *Clay.*] Therefore, even supposing Parliament were to impose an equal mileage rate, that would not remove the difficulty, according to your idea?—I do not think it would; it would not be possible to carry it out. If a railway company can show a traffic to their shareholders which is likely to pay them they will always get enough capital to form a limited liability company, to run a line of steamers. I may say that I have ships to spare, and if they can show me that a trade will pay I would run them.

528. Mr. *Pollard Urquhart.*] I think you stated just now that the vessels that run between Havre and Southampton belong to a railway company?—They do.

529. How long have they belonged to that railway company?—I think it was four or five years ago that Parliament sanctioned it.

530. There have been vessels running in conjunction with the railway companies longer than that, have there not?—Yes; it was an independent company formerly.

531. It is only four or five years since the London and South Western Railway Company got the power?—Since they got power to undertake the steamboats themselves.

532. Is there any competition now there?—None whatever.

533. Have the London and South Western Company raised their fares either to Havre or to Paris since there has been no competition?—I think not; that is on account of the competition direct and by way of Brighton, and by way of Folkestone and Boulogne, and Dover and Calais. I am not aware of their having raised them.

534. Would not the competition with the other lines prevent railway companies from raising their fares in like manner, in places where they have run the private shipping companies off?—They do not at present accommodate the public; for instance, I mentioned the case of my friends asking them to assist them, because their American trade is not accommodated, and they sometimes are obliged to charter steamers under the French flag to bring over their goods for their American steamers, because the South Western Company cannot bring their goods over.

535. The accommodation for passengers is very good, is it not?—The accommodation for passengers is very nice.

536. Could passengers be as well, or better, accommodated than they are now if it were in the hands of an independent company?—Yes, better I think; quite as well, certainly.

537. That is, if there were an independent steam packet company running?—Quite as well.

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538. It could not be better, could it?—I do not know about that; quite as well.

539. You were speaking of the Eastern Counties' Company charging more from London to Harwich, than from London to Rotterdam; are you not aware that such things have been done by other companies, besides steamboat companies, acting in conjunction with railways; in the old times of stage coaches they used to charge less, although the distance was greater when there was competition, did they not?—Yes; but anybody else could put a stage coach on; it was not conducted under Parliamentary powers; but I cannot put a railway on.

540. You acknowledge that this trick of charging more upon short distances, than is charged upon long distances, is not peculiar to these amalgamated railway and steam packet companies?—No, it is not.

541. Do you know the coasting trade; has such a thing never been done, as, that vessels plying between two capitals, like London and Edinburgh, have charged more for intermediate stations than they have charged between London and Edinburgh direct, when they have been exposed to great competition?—I am not aware that they have; they may have done it, very likely.

542. You think that they may have done it?—Yes.

543. This plan of charging less for long distances, where there is great competition, than for short distances, where there is less competition, is not peculiar to these railway and steam packet companies, is it?—No.

544. Mr. *Adair.*] In all those cases there is no monopoly of the land-carriage, is there, as there is in the case of a railway?—No, none whatever; we are perfectly powerless when we come into competition with a railway; they can divert the traffic as they please.

545. *Chairman.*] Your allegation as to the unfairness of railway competition is founded upon this; that by a practical monopoly which Parliament has given to them upon the shore, they have the power of diverting the sea traffic for their purposes?—Yes.

Frederick Somes, Esq., called in; and Examined.

F. Somes, Esq.

546. *Chairman.*] I THINK you are a sailing shipowner to a very large extent?—I am, to a considerable extent.

547. And Chairman of the General Shipowners' Society?—I am.

548. Does that society include steam-vessels, or is it confined to sailing-vessels?—It is confined to sailing-vessels; the steam shipowners have a society of their own to look after their interests.

549. I think you have been delegated here by that society, of which you are the chairman, is not that the case?—I have.

550. In order to express their opinion upon the question which this Committee is appointed to consider?—Yes.

551. Will you tell the Committee what that opinion is? Their opinion coincides with the opinion of the Steam Shipowners' Society, that it would be dangerous for the interests of the shipowners generally to grant a power of that description to railway companies.

552. Can you tell me at all what amount of tonnage your association represents?—I cannot say what amount of tonnage; of course it is very large, as representing the tonnage, not only of London, but of a great many of the outports of the kingdom.

553. Do you include the bulk of the owners of sailing-ships from London?—I do. The society which I represent, of course, is supposed to represent the opinions of the bulk of the shipowners of the kingdom, and more particularly of London.

554. What is the interest of the sailing shipowners in this case: I do not suppose that any railway company has proposed to put on sailing vessels?—I do not know that they do, but Parliament might give them power to own sailing ships as well as steamers.

555. You look at it as a question affecting the independence of shipowners generally?—I do.

556. As regards the sailing shipowners, I do not suppose you contend that if they own sailing ships exclusively, any injury will arise to them from the granting of these powers?—They certainly look upon it as affecting steam shipowners

owners more than sailing shipowners, but they look upon it as affecting them also as a body.

557. Will you explain in what manner?—In this way; that the railway companies may just as well have the power of owning sailing ships as steamers. I do not know in what particular way, but if they have the power of owning steam ships, I do not see why they should not have that of owning sailing ships.

558. Practically, is there any probability of that power being given?—We do not know that there is at present.

559. The object, as I understand it, of these powers being granted to railway companies to establish lines of steam communication, is in order to have a rapid and steady communication with continental ports in connexion with the running of railway trains. I do not apprehend that those considerations would apply to the case of sailing-vessels?—I should say not.

560. We may take it then that, as far as the sailing-ship interest is concerned, that interest is not much affected by whatever may be done in this matter?—Not as regards the passenger traffic, certainly not.

561. As regards the goods traffic, would it be so?—It might be; it is impossible for me to say; it might be as regards the goods traffic.

562. You mean that a line of steamers established by a railway company might compete with your sailing-vessels for goods traffic?—It is possible that they might do so.

563. Can you name any line on which that might take place, or any class of traffic which would be so affected?—I cannot name any particular line where they might compete with sailing ships.

564. What are the objections which your society takes to the granting of these powers to railway companies?—That it would interfere with the private shipowners in a general way; it might do so seriously.

565. Have you heard the evidence of the former witnesses?—I heard the evidence of Mr. Robinson, and part of that of the former witness.

566. Do you concur generally in the reasons which you have heard assigned why railway companies should not possess these powers?—Yes, I do; I heard the last witness give his evidence, and I perfectly agree with what he stated.

567. Will you undertake to say, from your own knowledge, that the sailing-ship interest, as a body, are opposed to these powers being granted?—Most decidedly I do undertake to say that.

568. Mr. *Hodgson*.] You will not say, I presume, that the sailing-ship interest has any immediate apprehension of interference with their trade from the powers proposed to be given to the railway companies?—We do not know of any particular way in which it might happen at present; we do not see it; at the same time we view the change with great apprehension.

569. Do you conceive that the steamboats compete at all with the sailing-vessels at the present time?—Not in short traffic; not in passenger traffic.

570. In any trade do they do so?—Yes, there is no doubt that they do.

571. If those steamboats were the property of railway companies, would they compete in any greater degree than they do at present?—Yes, I think they would.

572. In what respect?—Because they can make what rates they please, and drive all the private companies or private owners off their line; of course, no private company could compete with a railway company.

573. Mr. *Clay*.] Some of the witnesses whom we have had before us have expressed their belief generally, that if Parliament was to grant these powers to railway companies, practically, before very long, a very large portion of the shipowners' business of this country would be in the hands of the railways. Supposing that fear to be realized, does it appear to you that there is any good reason why the railway companies should not then seek to possess themselves also of that portion of the ship-owning business, which is better carried on in sailing vessels?—I do not see any reason why they should not.

574. Therefore, although you do not see an immediate interest of the owners of sailing vessels in this question, it appears to you by no means improbable that a time might come when the interests of the owners of sailing-vessels might be very seriously affected?—That is not at all improbable.

Jovis, 10° *die Martii*, 1864.

MEMBERS PRESENT.

Mr. Adair.	Mr. Hutt.
Mr. Clay.	Mr. Kinnaird.
Mr. Algernon Egerton.	Mr. Lygon.
Sir James Fergusson.	Mr. Massey.
Sir Francis Goldsmid.	Lord Stanley.
Mr. Richard Hodgson.	Mr. Pollard Urquhart.

THE RIGHT HONOURABLE LORD STANLEY, IN THE CHAIR.

George Burns, Esq., called in; and Examined.

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575. *Chairman.*] I BELIEVE you were formerly a partner in the firm of George and James Burns?—Yes.

576. They are steam ship-owners in Glasgow, are they not?—Yes.

577. I think you have now retired from that concern?—I have.

578. Is it a fact that at the time when you quitted the concern their investment in steamers amounted to the value of two millions?—It was thereabouts when I left it, and it is as much as that now.

579. You have been for nearly 40 years interested in the steam-boat trade between Glasgow and the Irish ports, have you not?—I have.

580. And also between Glasgow and Liverpool?—Yes.

581. Were you managing partner of your firm?—I was.

582. Is that firm, of which you have spoken, connected with the Cunard line of steamers?—It is.

583. And with Mr. M'Iver, of Liverpool?—Yes, but I may mention that although they are connected, they are all distinct ownerships; that is to say, that the owners are not all throughout partners.

584. Have you at present steamboats running every week day between Glasgow and Belfast?—Yes.

585. Carrying mails and conveying goods and passengers?—Yes.

586. Have you also steamers trading twice a week between Glasgow and Liverpool?—Yes.

587. Are you aware that there has been for many years a regular communication for goods and passengers three times a week each way between Glasgow and Port Rush and Londonderry, and also between Glasgow and Sligo?—Yes, perhaps I may hand in a list of the vessels belonging to the firm with which I was connected. (*The same was handed in. Vide Appendix.*)

588. Do the steamers for goods and passengers run three times a week each way between Glasgow and Dublin?—Yes.

589. In all the cases that you have mentioned, and generally as regards the trade between Scotland and Ireland, and between Scotland and Liverpool, has that trade been carried on by private enterprise exclusively?—It has.

590. In the event, which is probable, of that trade increasing, do you apprehend that there would be any difficulty in finding additional capital to increase the accommodation?—Not in the slightest degree.

591. I think you have always been opposed to the granting of powers to railway companies to use and maintain steamers?—Always.

592. And your firm have taken an active part in opposing the granting of such powers?—They have.

593. Did

593. Did your firm oppose the granting of such powers to the Glasgow and South Western Railway Company in the Session of 1855?—Yes.

594. What was the line for which the power was then sought by the railway ompany?—From Ardrossan to Belfast. In the Bill originally they sought ower for other places, such as Londonderry, but those powers were withdrawn efore it went to the contest in the Committee.

595. I believe that Bill was rejected, and no similar application has been since made?—No; it was rejected, and no application of the kind has been made since.

596. Is it the fact that your firm has expended considerable sums in opposing these schemes, even though their own interest was not directly affected, from a general objection upon principle to the granting of those powers?—Yes.

597. In order to prevent a precedent being created which might injuriously affect you hereafter?—Yes; precisely so.

598. Taking the case of that application, which was made by the Glasgow and South Western Company in 1855, what do you apprehend would have been the result if that had been granted?—I think the result would have been in all probability that the Caledonian Railway Company would have applied also for power to ply steamers; that would have been one result of it, and then private enterprise would have been entirely destroyed by the railway opposition.

599. You would have had, I presume, one of two alternatives presented to you, either to give up altogether, and leave the railway company in possession of the field, or else to amalgamate with them?—Yes.

600. Do you think that any diversion of traffic from other ports to those to which the railway and their steamers ran would have been likely to occur in such a case?—There would have been a diversion of traffic from the ports of Glasgow and Greenock to that of Ardrossan if the railway company had obtained the powers which they sought, because as a natural consequence, as I hold, they would have reduced their rates. I may explain here that at the present time, and for years past, the rates have been precisely the same to Belfast whether a passenger went by way of Glasgow and Greenock, or by way of Glasgow and Ardrossan, so that the public have had the perfect choice in selecting either the one route or the other, both for goods and passengers. That has existed for a long time. It existed at the time when the Glasgow and South Western Company made their application to Parliament to obtain those powers. Therefore, there was a fair field, I may say, and no favour between the two parties competing for the trade.

601. Do you suppose that if one company had obtained these powers any rival company would have been driven, in self defence, to obtain similar powers?—I have no doubt of it.

602. Probably the Caledonian Company would have done so, would they not?—Yes.

603. Would there not, in that case, have been a competition between those two companies, even excluding the competition of any private owner?—I think it is highly probable that there would have been a competition carried on for a time, but I am equally confident that that competition would have come to an end by an arrangement between the respective railway companies, raising the freights higher than they had been before.

604. Competition would have ended in compromise?—Yes.

605. Are there any facilities for making such arrangements or compromises between railway companies which do not regularly exist between powerful steamship companies?—I do not know that there are any.

606. Your argument is this, that the competition between two railway companies, both possessing powers of this kind, will not be maintained, and therefore will not benefit the public, because it is sure to end in an arrangement between them?—Yes.

607. I put it to you now, what is there to prevent a similar arrangement being come to between great shipowning firms, such as that which you represent, with one another?—There is no reason why they should not make arrangements. Where a violent competition might have been carried on between two independent steamboat companies sooner or later some arrangement will be come to as to the freights and passage money. But then those are not Parliamentary companies, and not protected by Parliamentary powers.

608. Taking the traffic between Glasgow and Liverpool, are you able to com-

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pete successfully in the carriage of heavy goods with the land conveyance?—We are able to compete successfully against them for a certain description of goods. I may mention that before the railways came into competition there were almost daily sailings of the steamers employed between Glasgow and Liverpool. Now they are reduced to three in the week between the other competing company and ourselves. And although at first, when the the railway was established, they naturally obtained a great quantity of goods of descriptions that seemed properly to belong to them, such as the lighter and finer goods, yet there is a species of goods, comprising heavy coarse goods, that cannot afford to pay the larger railway freight that as naturally belongs to the steamers, and those goods we can carry upon cheaper terms by sea than they can by land.

609. I presume we may take it that sea transit is always cheaper than land?—It is always cheaper.

610. Assuming any railway company to obtain the power of running vessels, say between Glasgow and Liverpool, would it be the interest of that company to carry on that business permanently, or would it be their interest only to drive you and all other competitors off, so as to secure a monopoly of that business for their land transit?—I believe it would be their interest to drive all competitors off. At present I may mention that the competition of the steamers running from Glasgow and Greenock to Liverpool performs the action of a check upon the Railways—they cannot raise their freights much higher without diverting to the steamers a certain quantity of freight. Then, again, there are arrangements which exist between all railways. For example, the Glasgow and South Western have a line to Liverpool, and certain arrangements exist there, and I have no doubt that the Caledonian Company and others who carry direct to Liverpool are afraid of unsettling those things, and therefore we are allowed to go on in some measure of peace.

611. I apprehend your objection to the competition of a railway company does not depend merely upon the fact of their possessing a larger capital than any shipowning firm?—It does not.

612. Will you explain what your objection is founded upon?—A large capital is certainly one element; but it is the invisible power of the railway that I dread more than the capital. I look upon the danger as arising in this way: that where there is a railway company who have a large capital and a large revenue, they can diffuse any reduction they might make upon the steamboats which they wished to drive off over a large surface, so that it would be entirely or almost imperceptible in the dividends for a time. That is what I dread.

613. What you object to, if I understand it rightly, is the power which the railway company possesses by the practical monopoly which it has of land traffic being employed to control the sea traffic also?—Yes.

614. I suppose you do not make it a ground of objection that the sea service which is performed by railway companies is inadequately performed?—I do not put it upon that ground so much, but I maintain that private individuals are able to carry it on not only as well, but in many respects better than they can. I may give you an instance in the Folkestone and Boulogne trade. That trade is very well performed. I am not making any complaint against it at all. I have crossed there many times, and I crossed last year, and from my own knowledge of the rates that are paid and the passage-money, I think it is a capital trade for a private individual to enter into. I should have no hesitation about it whatever, if the railway company would treat the private owners' boats in precisely the same way as their own boats are treated at the present moment. And, further than that, I may mention that in crossing last year there were two fine new steamers advertised to be on the line, and I was very anxious indeed that they should be running because the shortening of the passage to me is a matter of great personal convenience; but those vessels did not make their appearance, they continued to be advertised, but I went in one of the old vessels. If it had been in the hands of private individuals I am confident, from my own experience, that the public would not have borne with them in such a way, and that they must have put the vessels on the line. The railway company itself, if they had been an independent power, would have called upon them to put them on. I do not make this objection seriously, I only say that the trade could have been perfectly well carried on by private individuals at that particular point.

615. Is it a fact, that as regards the coasting traffic, the steamers have been able to compete successfully with the coast railways?—Yes.

616. Do they compete with the railways in carrying between Liverpool and Bristol,

Bristol, between London and Hull, between London and Leith, and in other similar cases?—Yes; they do.

617. Mr. *Pollard Urquhart.*] Between London and Aberdeen also, they compete successfully, do they not?—Yes.

618. *Chairman.* It has been stated that one advantage of this union of powers in the hands of a railway company is the increased facilities, including through booking; is that your opinion?—No; it is not.

619. Did the system of through booking exist previously to such powers being granted?—Yes it did. It has existed as long as I have had anything to do with the trade. Before railways were in existence large quantities of goods were sent down from the interior of England to Liverpool; for instance, earthenware from Staffordshire, and Birmingham goods, and so on, and they were all booked through by the canals to Liverpool, and were charged forward to Glasgow or wherever their destination might be.

620. You have yourselves, I think, been in the habit of booking through to a large number of places?—Yes.

621. Can you state, from your own knowledge, that that is the custom of many other private companies?—Yes. If the Committee will allow me I will hand in a table showing the through bookings by the Belfast and Liverpool steamers.—(*The same was handed in, vide Appendix.*)

622. In certain cases the possession of a harbour has been given to a Railway Company, has it not?—Yes.

623. Can you state at the moment what those cases are?—I can only go generally into it. I cannot go particularly into the question of the harbours, and who have possession of them, because the railways happen not to possess any in any quarter in which I am more immediately interested.

624. Where that is the case, do you think that that is a reason in favour of or against the company being permitted to own sea-going vessels?—I think that where harbours are in the hands of a railway company it would add to the evil of unfair competition.

625. The evil being, in your view, a monopoly of power in one hand?—Yes.

626. They would be able to give to their own ships advantages in regard to that harbour which other ships would not possess, would they not?—That is my opinion.

627. That power, coupled with the power of running trains in connexion with their own ships would give them an undue preference over any other competitor, in your opinion?—No doubt.

628. I presume, from what you have said, that you are opposed to the granting in any case of this power to any company?—Yes.

629. I presume you exclude from that the case of a ferry, and of sea passage so short as to be considered only as a ferry?—With reference to the ferry, I could have no objection, if it were strictly confined to the ferry, but unfortunately, from the experience which I have had in Committees, the definition of ferry obtains a very wide range; that is what I am afraid of. I think some defininition, such as that powers should be refused to railway companies to own sea-going vessels, would bring it more within the proper limits. Perhaps something like this might embrace the view which I have been stating. No power of purchasing, hiring, or providing steam-vessels shall, under any circumstances, be granted to any railway company, except for the purpose of effecting a transit to such vessels between the termination of the railway belonging to such companies upon the one bank or shore of a river or estuary and the other bank or shore of the same river or estuary.

630. *Chairman.*] Have you any other paper which you wish to hand in?—I have a list of the steamboat owners in the Irish Clearing House.—(*The same was handed in, vide Appendix.*)

631. Mr. *Massey.*] Are you aware of any instance in which the possession of steamboat powers by a railway company has caused the extinction of an independent private enterprise which was previously in operation, or in which it has resulted in undue charges to the public?—No, I am not aware of any such case.

632. Sir James *Fergusson.*] Where steamboat companies and railway companies establish in conjunction a continuous line, does not through booking accomplish the same result as the employment or subsidizing of steamers by railway companies?—Booking through gives the same results so far as the convenience to the public is concerned, but it leaves the respective parties

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independent bodies, it leaves the railway to their own management upon the land, and leaves the independent steamboat company to its own management upon the sea. As a question of convenience to the public, it produces the same result as if the steam-vessels were owned by the railway company.

633. Are not the steamers which are thus in partnership with the railway companies enabled in that way to run cheaper than those of steam ship owners not so subsidized?—They are not able to be run cheaper if the owners mean to derive a profit from the running of the steam vessels.

634. Referring to your illustration of the Belfast traffic, and taking the case of the steamers which you run in connection with the Caledonian Railway from Greenock, could the Caledonian Railway, without loss, run steamers at rates lower than those which are paid under the present system?—They could not if there is to be any profit at all upon the running of the steamers.

635. Then no accommodation would be established by that Company, having the power to run steamers of their own from Greenock, that does not exist by the through booking arrangements between you and them?—No, there would be no improvement.

636. In the same way there would be no greater disadvantage to any independent steamship company?— Yes, there would be a very much greater disadvantage, because, supposing that the Caledonian Company got power to own steamers, and to run them to Belfast, how could I compete against that company, they having the whole power of the inland carriage, and managing it in such a way as they pleased.

637. You say that they could not charge lower rates between Glasgow and Greenock, without loss, than you and they now charge in conjunction?—I say so; but they would submit to a loss for a time in order to monopolise the whole sea traffic.

638. My question is, if they did not choose to submit to a loss, could they charge lower rates?—If they choose to submit to a loss, they could charge lower rates

639. Only in that case?—Yes, only in that case.

640. You said, I think, that you were not aware of instances in which rival steamship companies had combined in the same way that railways might do, and had established similar rates?—I think the question that was put to me was, whether I knew instances of rival steam vessels combining. My answer was to this effect: That if the competition happened to be carried on upon any particular line, it stands to common sense that the people competing upon that line would naturally desire to have some arrangement made in order not to waste each other's property by being independent or unprotected companies, in any way whatever; but any such arrangement could be broken at any moment. I can give an illustration of that.

641. Is it not the case that the rival lines of steamers between Leith and London have for a great number of years concurred to charge the same rates as each other?—That is very likely. I cannot speak positively from my own knowledge to that, but I think it is very likely, and if you will allow me, I will give you an example in point. I have already stated that the rival lines of steamers is between Ardrossan and Belfast, and the Upper Clyde Ports and Belfast, and they carry upon precisely the same terms. The steamers from Ardrossan at one time reduced their rates so as to make it a very unproductive matter to all parties while that competion continued. The late Lord Eglinton asked if I would see him. I said I should be most happy. He called upon me and said, "'Tis a pity to see this work going on, and the steamship owners destroying each other." I said, "My lord, I am very sorry for it, and ten days ago I wrote to our agent in Belfast, to ask if nothing could be done to stop this folly. I know that Ayrshire ought to have its complement of steamers, and I have no objection that they should run upon precisely the same terms." He said, "I think if the other parties who have the management of this affair, would look upon it as you do, it would be easy to arrange." He then said, "I am glad to hear you express such sentiments. I said, "Let it be put upon exactly the same footing—let it be arranged that a man may go from Glasgow to Belfast, either by the Caledonian Line down to Greenock and then by Steamer, or by the Ardrossan Line as he pleases, and pay the same amount." He said, "I am perfectly satisfied with that." That was a very natural and common sense arrangement.

642. It was the case there that those parties, though independent, were able to make the same sort of arrangement as to fares that the railway companies might make,

make, was it not?—Yes. I may also say further, with respect to the steamer which runs from Ardrossan at this moment that although for some years the proprietor of it, and also the owners of former steamers, most faithfully kept that arrangement, yet at this moment we know goods are taken at lower rates than we do. We cannot wonder at it upon these grounds: We consider that we have the superior means of conveyance of the two, and that the public, notwithstanding the reduction of rate, in order to divert the traffic to Ardrossan prefer us, we having, I do not hesitate to say, better vessels and a more convenient route for the receivers of goods.

643. What objection have you to the traffic between points upon the same banks of an estuary being left to a railway company that you would not have to points on the opposite coast being left to them?—I should have a greater objection to that; but the case which I defined was where there are cases of *bonâ fide* ferries necessary. I do not object to the granting of it in those cases, but what I am trying to avoid is the stretching out of the word "ferry" to a thing that it was never intended to mean. Whilst I am upon the point of Ardrossan I may mention what Sir Andrew Orr, who was the Chairman of the Glasgow and South Western (Androssan) Company at the time of this application for the power to own steamboats, stated, in my hearing at a public meeting—my brother and myself held an interest of upwards of 30,000*l.* in the railway, but for all that, we could never get a particle of information about the steamboats. Sir Andrew Orr said, after mentioning a particular Bill that they were applying for, and referring to the increased capital and so on, he said, "The other Bill is the one for placing steamers in connexion with this railway and the Irish trade. The trade has been carried on for a great many years under great disadvantages, because the present position of matters was different from what they once were. Ardrossan had her hand on the whole trade of Scotland and the North of England, and stood in a peculiarly favourable position for carrying on this ferry, as it may be termed. It stood in the same relation to Ireland as Dublin and Holyhead. The passage was fully as short, and was easier and safer. The directors considered the amount of capital required to be not at all equal to the advantages likely to be gained by it. For this steamboat measure he thought 50,000*l.* would be the amount required, but it would depend entirely on the amount of trade. A single boat would require only 15,000*l.*, and so on in proportion. The expenditure would at first be only on two new boats, and perhaps one of the old ones. The harbour of Ardrossan was to be enlarged and improved by the noble proprietor at his own expense, and the harbour of Belfast, of course, was open. The boats were insured; and even should it turn out a ruinous speculation, the whole loss would be the depreciation of the boats for a year or two; and if it turned ont as the directors expected—and after two years study they should be acquainted with the matter—instead of loss there must be a considerable profit. The ferry business itself might not be a profit, but they had two or three hundred miles of railway upon which they carried traffic, and if they increased the traffic on the railway they would not care though the ferry *per se* might not pay." That was Sir Andrew Orr's expression at a meeting at which I was present, and although, as I have said, I was a large shareholder, I could not elicit any information as to their practice with the boats which were then running from Ardrossan, and which I had the best reason for believing were assisted out of the railway funds, although not incorporated with them.

644. Mr. *Adair.*] Were their separate accounts kept by that railway company of the earnings of the railway and the earnings of the ferry?—They did not profess to have anything to do with the boats at that time, they were carried on by private individuals, and therefore their expenses could not be brought into the accounts. What I wanted to know at the meeting was, whether the funds of the railway were devoted to the support of these steamboats; I could not find that out.

645. As a large shareholder of the company you were unable to obtain any information upon the state of their affairs in that respect?—Quite unable.

646. Mr. *Algernon Egerton.*] There is a considerable traffic by sea between the Clyde and the ports on the Mersey at present, is there not?—Yes.

647. I suppose there is great competition between the railway companies and you for the conveyance of that traffic?—Yes, a very great competition.

648. Supposing the railway companies were to be allowed to combine and to put down a line of steamers, what would be the effect of that upon the steam

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traffic between Glasgow and Liverpool?—The effect would be, that my friends would immediately say,—"We must back out of this trade; we could not stand this; we must withdraw the steamers, and get them sold, in order to get out of what would be a ruinous trade to them;"—the effect to the public would be that after we were driven off the rates would be raised.

649. Do you think it would have any effect upon the traffic going in sailing vessels?—Yes; I think it would.

650. In what way?—In just the same way. By lowering the rates so far that the steamers could not live, the sailing vessels also must be, to a certain extent, affected by that lowering of rates, and ultimately the railway would swallow up the whole of the traffic, and get it into their hands.

651. They would get all the heavy traffic as well as the light traffic, which you think they have a right to?—Yes.

652. Supposing that a railway company owns a harbour, and has no power to use its own steamers in that harbour, do you consider that, if there is a fair promise of trade for that harbour, private companies may be relied upon to develope that trade?—Yes. Reverting to what I said with respect to canals before, I may say that at this moment there is a trade carried on through the Bridgwater Canal and the Forth and Clyde Canal at Glasgow with our steamers. That trade the railway of course would get hold of entirely if they could knock us off, and the rates no doubt would be raised.

653. Mr. *Lygon.*] Can you mention any ferry over which a railway company possesses power to which you do not object?—No; I object to the general principle; I have only said that I would propose that there should be some better definition of a ferry.

654. I understood you to say that you did not object to a ferry crossing an estuary?—I say so for the purpose of having it properly defined. I would have been well contented and thankful to have been spared the trouble and expense of coming to Parliament so often as I have been obliged to do if the powers could have been fairly kept within the bounds of what a ferry really means.

655. Can you instance any particular locality to what your objection would not apply?—I believe Grantham may be considered as a ferry, and likewise Dundee and the place opposite to it—that is a ferry.

656. Is there any distinction to be drawn between the ferry at Grantham and the passage between Dover and Calais?—Yes, I think the distinction ought to be drawn that the traffic between Dover and Calais is a sea-going traffic, and could be supplied perfectly by private enterprise, as I have already said with regard to Folkestone and Boulogne.

657. Could not the ferry at Grantham be equally supplied by private enterprise?—So it might. I do not say it might not, but it is an inland ferry—it is a very different thing from going out to sea and going across the Channel.

658. Mr. *Hodgson.*] In fact you object to any steamboat power whatever being granted to railway companies, do you not?—I object to it, as I have already explained once or twice, upon the ground that it is so difficult to keep the railway gentlemen within the limits of a ferry; otherwise I should not object to their obtaining the power of only connecting their railways upon one side and the other of a river or estuary.

659. Are you aware that Parliament has already in several instances extended the powers beyond what you conceive to be the definition of a ferry?—I am quite aware of that.

660. And that railway companies now have the power to put on steamers to Continental ports?—Yes.

661. Do you think that that is a public advantage or not?—No; I think it is a very great disadvantage.

662. Do you mean a disadvantage to steamboat proprietors or to the public?—I mean not to the steamboat proprietors alone, but also to the public.

663. Why should it be a disadvantage to the public?—Everything that tends to swallow up or extinguish the steam interest of the country I think will ultimately be a very great disadvantage to the public, and those powers which have been granted by the respective Bills which you allude to are all tending in that direction, to establish a complete control and monopoly in the hands of the railway companies possessing those vessels.

664. What do you mean by extinguishing the steam interest of the country? You do not mean, I presume, that railway companies will not employ steam-

boats

boats upon the passage?—No; I mean that they will be extinguished as an independent body.

665. Do I rightly understand you to say that the public are of the same opinion that you have expressed just now, namely, that it is a disadvantage to them that the service between port and port, each port being connected with a railway, should be performed by the railway companies?—I have mingled a good deal with the public, and have had opportunities of hearing the opinions of many people, and I am of opinion that the public generally object to the amalgamation of steam companies and railway companies.

666. You appeared last year before the Board of Trade with several other representatives of steamboat companies to oppose these powers being given to railway companies, did you not?—Yes; at least the parties I represent. I did not personally appear.

667. Did you get any sympathy or assistance from the public, apart from steamboat proprietors, in the movement which you then made?—Yes; no doubt—I can speak for my own community—the city of Glasgow were generally with us; that includes people in no way interested in steam navigation.

668. I ask, did you get any sympathy or assistance in the representations which you made to the Board of Trade upon that subject from the public, apart from the steamboat owners?—I do not remember upon that occasion, because I was not engaged in it as much as in former years, but in former years we got all the support that could be given from the Chamber of Commerce, and from other communities. I think, therefore, that I can speak of the public feeling in the matter. I must also explain this, that I go upon the ground that in the first instance reductions would be made by the railways in order to drive off the competition of private steam proprietors. The public, of course, in the interval would not suffer, but ultimately they would suffer, and when it came to be too late, then you would find the public voice raised against it. We cannot expect the public at present, while they are comparatively exempt from the suffering that I hold would come upon them, to come out very loudly in such a matter. But in the former instance in which I was engaged, the Chamber of Commerce of Glasgow went strongly against the powers being granted.

669. You stated to the Committee that you had experienced the passage from Folkestone, I think?—I have.

670. Have you been across since the new vessels were established?—I returned from the Continent last year in one of the new vessels.

671. Did you think that the service was well performed?—Very well. I make no complaint. I only say it could have been as well performed by private individuals.

672. Were the fares high, in your opinion?—Yes; they are higher a great deal than we can manage to get in our part of the world.

673. Do you think that they are higher than they would be if that passage were supplied by private enterprise?—I think they are. If it were left open to private enterprise the fares would be lower.

674. That is, the steamboat fares?—Yes.

675. In that case the invisible power which you spoke of just now has not been exercised; has it?—Yes; I think it has been exercised in this way. There is no occasion to exercise it to drive off competitors, because there are no competitors there, but they are just doing what I stated would ultimately be the case, that the railways would raise the rates. Generally their rates are very high just now compared with what we and other steamship owners could get. The Company have had no competitors to drive off, and therefore they have fixed their rates at what would be very remunerative.

676. You think that the fares by the railway company's steamboats from Folkestone are so high that private enterprise might compete with them?—No; I do not think that private enterprise could compete against any boats owned by the railways.

677. I spoke regarding the rates?—Yes, if you were to give them the same opportunities which these boats now possess. I was satisfied that a good profit was made by that steam trade.

678. If Parliament provided that if private companies or individuals established vessels in competition with those vessels they should be charged tolls corresponding with the rates charged on goods and passengers using the railway boats, do you think that would be a protection to private enterprise?—I think none whatever.

679. Why do you come to that opinion?—If that clause were inserted in the

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Act, and if any private individuals were foolish enough to lay on vessels alongside of the Folkestone vessels, the Railway Company has it in its power to reduce the rate by sea so low that neither the private individuals nor even themselves could live. They would say, "We will take it at the small rate of 1 *s.* or 2 *s.*, or whatever they pleased, and you private gentlemen shall have the same rate as our own boats," well knowing that the private owners could not live.

680. I think you stated already that the same practice sometimes obtains in regard to large steamboat companies as affecting individual steamboat proprietors, or small steamboat companies? — What I said was, that when a ruinous competition was carried on, common sense dictated that some arrangements should be made between the parties, who would naturally say, "You cannot drive me off, and I cannot drive you off; let us arrange our rates." But I hold that there is a controlling power above both the private parties, and that that power is the public. The public will not stand, where the companies have not Parliamentary powers, any excessive rates.

681. Do you know of any instances in which small Companies, or individual proprietors of steamboats, have been driven off?—No; I cannot speak particularly of that.

682. You have not known instances of that kind, then?—No, I have not known instances of that kind. I have known instances in which by the natural course of events, in consequence of a company managing its affairs better, or having better vessels, it has displaced other companies.

683. Has your firm itself ever entered into competition with other companies until it has displaced them?—No; except in the way which I am trying to describe to you.

684. Will you more fully describe it?—When I was first engaged in steamshipping, having been previously engaged in smacks, and the carrying trade from Liverpool, our vessels were better than the vessels of that day, and, as a natural consequence, we got more traffic. At the time which I speak of, there was a very large traffic in passengers to Liverpool; the railways were not then opened. The superior vessels obtained, no doubt, the larger supply of passengers, and as a natural consequence, the older and inferior vessels gradually went down; but we never drove anybody off the Liverpool line. On the contrary, we were ourselves in great danger of being driven off the line at one time; and the Company that gave us that very hard run for life exists now.

685. Do you run vessels from any port in Scotland, except Glasgow?—No.

686. Is there this difficulty, namely, a disinclination on the part of the steamboat proprietors to shift their trade from one port to another?—There is this natural disinclination, that if a person is engaged in a particular trade, and has no particular desire to extend his trading operations, why should he go to another port which he thinks would be unproductive.

687. Then, there is the disinclination to which I refer?—I cannot tell as to the disinclination of all the steamboat owners. If you ask the question in a general point of view, I say there is no disinclination whatever on the part of steamboat owners to go anywhere where they can make money. I understand you to put rather an individual case, whether when a man is in possession of a trade he would be inclined to go away and try a speculative trade. I say "No" to that.

688. You run steamers from Glasgow to Dublin, I believe?—No; to Belfast.

689. And from Glasgow to Liverpool?—Yes.

690. Supposing it were represented to you that there was an opening to send vessels from some other port in Scotland to Belfast, and from some other port to Liverpool, would you not have a natural disinclination to remove your trade from Glasgow, where it exists, to another port where the trade might be rather speculative than not?—Perhaps the best answer to that is, the matter of fact that we were asked to go to Ardrossan and leave the other ports. I said, "Why should we go there? Our natural port is Glasgow; we have been carrying on our trade there for years and years. I have no desire to go to Ardrossan." Nay, more, Lord Eglinton said, "Had not you better take the whole of the vessels in your hands? You understand steamboats better; take both those ports." I replied, "No, thank you, my Lord; I will remain where I am. I have no objection to wholesome competition, but I have no desire to have the vessels. Why should I go to Ardrossan?"

691. My question was, whether there was not a disinclination to remove a trade

trade from its established site to another port where there might be a trade, though nobody could be certain of it. I think your answer is in the affirmative, that there is a disinclination?—There is a disinclination on the part of companies already existing, inasmuch as they believe that they are already carrying on the same sort of trade that might be developed elsewhere, and in a better way too. But I couple that with saying that there are plenty of people with their capital engaged in steam business who would be glad to go to any new port where it could be pointed out to them that probably they might make a good thing of it.

692. Supposing they did not go there, if there were a railway company going to the port, would you prevent that company from running steamships to that port?—I need hardly answer that question otherwise than by saying that all my life I have been trying to prevent it.

693. In that case also you would prevent it?—Certainly.

694. You have read, no doubt, a passage from the Board of Trade Report presented to Parliament last Session, in these words:—"In the following cases it appears to my Lords that no well-founded objection can exist to granting steamboat powers to railway companies, namely, Firstly, When the railway company has a line terminating at a port in an important district the export or import tr of which is shown to Parliament to need development, and which is not supplied by private enterprise with the requisite steam communication, either at that port or any other port which can afford reasonable facilities for the trade in question." Would you go so far as to deny to railway companies the power in such a case as that?—I go so far as to say, that I am sorry to say that I do not agree with the Board of Trade there.

695. Mr. *Clay*.] There are no vessels owned by private owners running between Folkestone and Boulogne are there?—No.

696. Are there any running between Dover and Calais?—I am not aware that there are; I believe not.

697. Were there, previously to the powers being conferred upon the South Eastern Railway, any boats owned by private owners running between Dover and Calais?—I cannot say.

698. The traffic was chiefly carried on, I believe, by the Government boats?—Yes; it was at one time.

699. The result of that service, therefore, is not at all a fair illustration, is it, of what would be the general result of allowing railway companies to be owners of steamboats between port and port?—No. I do not think it is.

700. Sir *Francis Goldsmid*.] You mentioned an apprehension that railway companies, if they had these steamboat powers, after driving competition away, would raise their fares: do you know any case in which that has happened?—No, I cannot give you cases, because the position of the matter at present is, that they are as yet only making attempts to get these powers. We can, in resisting them, only argue upon general grounds as to what is consistent with a high degree of probability.

701. You stated, did you not, that you thought that the South Eastern fares between Folkestone and Boulogne were higher than those at which an equally good service could be carried on by private companies, if there were competition?—Yes.

702. Is that founded upon any calculation or any analogous case?—Upon a mental calculation, I may say; I know pretty well what should support a steam-vessel running for a certain distance, and I know that the rates that they charge for passengers crossing to Boulogne are what I should consider highly remunerative rates, and higher than could be laid on by a private steam company.

703. Do you remember what the first and second class fares are?—I think the first class is 8*s*. I believe that where passengers book right through from London the fare is something less; but I believe it is 8*s*. for the crossing.

704. Have you made any calculation which enables you to state what fare you believe could be charged, with an equally good vessel, so as to give a remunerative profit?—No; I have not gone into that. I have merely stated the thing generaly.

705. Mr. *Pollard Urquhart*.] I believe you said that the Glasgow and South Western Railway Company had applied for powers to run a steam-packet in connection with itself?—Yes.

706. Have any other railway companies that have their terminus in Glasgow. so applied?—No.

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707. Do you not think, upon the whole, that the passengers coming to Glasgow are rather inconvenienced on their arrival from different parts of Scotland for want of some sort of connexion between the railways that have their terminus in Glasgow and the steamers?—No; they would be neither the better nor the worse, supposing the railway company owned those vessels than they are at the present moment; it could not be so, it is impossible. I am speaking of the matter of convenience to the public.

708. The public, generally speaking, are not convenienced by any sort of through booking from any place in Scotland to any place beyond Glasgow; there is a want of such convenience, is not there?—No; there is no want of the convenience. We book through from Glasgow to Dublin by way of Belfast.

709. I do not think you book through from Belfast to any place in Scotland except Edinburgh?—No, not for passengers; but the inconvenience is nothing. When they arrive in Glasgow, on leaving our vessel they must go to some railway station or other. It is no doubt uncomfortable upon a wet day to cross from one terminus to another, but that is necessary.

710. I believe that the steamships, in connexion with the railway company have driven off the private enterprise between Havre and Southampton, have they not?—I believe so.

711. How long ago?—I cannot tell; I believe that is the fact.

712. Are you aware whether the joint railway company and steamboat company have raised their fares since they have driven off the steamers of private companies?—I may answer that in this way: We have a line of steamers of our own between Havre and Liverpool, which we put on as soon as the Navigation Laws were repealed, and I know this that the line which we have, not only keeps the line from Havre to Southampton at moderate rates, but that it has also had an important influence upon the whole American traffic by competing against French, German, and other steamers, in keeping those rates somewhat in a state of moderation.

713. Would not the same wholesome competition be sure to exist, even supposing that in particular instances the steamers in connexion with railway companies drove off other steamers, or would not there at least be a fear of that competition?—No; I think if the Havre steamers belonged to any railway company from Liverpool, they would not long continue carrying on the competition, but they would come to an arrangement with the Southampton Railway Company. They could have no interest in keeping down the rates, because they have no connexion with the American steamers, for instance.

714. Generally speaking, the railway companies have not been desirous to run steamers for very long distances, such as between Havre and Liverpool, or between Southampton and Liverpool, have they?—I think they have shown a considerable appetite for sea-going voyages already; there are before Parliament at this very time applications for steamers to Brest and other distant places.

715. Has not their application practically, in most cases, been confined to short passages, almost more resembling ferry passages than long passages, such as that between Havre and Liverpool?—It is very natural that they should begin with the small end of the wedge first.

716. They have only tried the small end of the wedge, hitherto, have they?—Yes.

717. You stated just now that you had no objection to railway companies running steamers across a small estuary.—I gave that answer, with several explanations which I have repeated at different times. I will repeat them over again.

718. For instance, you have no objection to a railway company running a steamer across the Frith of Forth in connexion with their railway?—I have no objection where it is a *bonâ fide* line of ferry, connecting one of their railways with the other; that is keeping them within rivers and estuaries.

719. Would you have any objection to a railway company running steamers from Port Patrick to Donaghadee, it is not any great width?—That is a special case; except upon the principle of the thing, I do not object.

720. Even from Glasgow to Belfast, the passage is only three hours at open sea, is it not?—I am happy to say it is so, because it makes it the more comfortable for all of us; but it is carried on well at present by the parties who are carrying

carrying it on, and I do not think that a railway company could do it so well as it is done now. What advantage that would be to the public I cannot see.

721. You afford great facilities for booking, I know; what is the reason why the Scotch Railway Companies afford no facilities to persons going from the interior of Scotland to Belfast *viâ* Glasgow?—I do not consider that they are much required from any place in Scotland. Glasgow is a very large city, you may say a terminal city; people come from all quarters to it, and there is no objection to people having to take out a ticket at the terminal office to carry them through to Belfast and other places; it is what exists in every large city; it exists in London. You might as well ask a Scotch railway to book through to Paris from Scotland, as ask that.

722. I only ask why do they not do it; the Irish railways do, do they not?—I should be very happy if they would; but with all due deference to the Irish railways, let me say that we had a great deal of trouble before we could make them see it to be their interest to enter into these arrangements. I am happy to say that they do so now. I do not see the same necessity in Scotland.

723. Why not?—Glasgow is a large city containing half a million of people, and it is also a great focus, a terminal place. There is no more reason why they should give tickets through Glasgow than through London.

724. Belfast, then, you regard as only a small place?—Belfast, I am happy to say, is rising in importance very much.

725. According to the logic of your argument, Belfast must be regarded as only a small place?—I do not see that. Why should a man, coming from Dundee, take his ticket to Belfast; he arrives in Glasgow, and goes straight to the Caledonian Railway Office and books, and goes straight to Belfast, or whereever it is he wishes to go to.

726. Then, you think, there is not any advantage in through booking?—I do not say that; I think there is great advantage in many cases; I only say that, in that particular case, I do not see any great advantage to the public.

727. If you arrived in Glasgow, just in time to go off to Greenock in a great hurry, would it, then, be a great advantage to you?—No, because I live in Glasgow; but any man coming from Edinburgh, I say, must go across by a cab or otherwise to the Greenock Railway; then it does not take him three minutes to get his ticket at the window.

728. The man may be run very short for time between arriving and departing?—There may be such instances.

729. I think, coming from the Perth and Glasgow Railway, it is always rather a run, is not it, to go off by the Greenock Line?—I think the effect of that argument would be to promote rather the union which there ought to be between railways, and to get the terminus all brought into one.

730. Mr. *Kinnaird.*] I gathered, from what you stated in reply to an Honourable Member, that you, as conducting the sea communication between Belfast and Glasgow, have thrown no obstruction in the way of through booking?—Much the reverse. I have already explained our system of through booking.

731. Your own company puts no obstruction in the way of through booking?—Very far from it.

732. You would rather encourage it in every way?—Yes.

733. You do not think it is absolutely necessary in traffic going through Glasgow as it is through some small places?—No.

734. I gather from your evidence that you do not object to exceptional cases, such as ferries, and in places where a distinct and immediate necessity can be shown, to short passages of the character of a ferry. You do not object to them, practically, at least, although you do in principle?—Yes.

735. If the Committee of the House saw that such a thing was absolutely necessary, you would not consider the granting of powers objectionable in such a case?—I have throughout stated that I do not object to the ferry principle, provided it be limited to what is really and truly a ferry.

736. But your grounds, as I gather, for objecting to railway companies owning steamers are that they would hold such a monopoly as greatly to interfere with the shipping interest, and so, ultimately, decrease the amount of steam shipping disposable for the benefit of the public?—Yes.

737. I think you are largely connected with the Cunard Line?—Yes.

738. At the time when the Crimean war broke out what facilities were given

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to the Government by the owners of that line?—We were able to grant very great facilities in the way of transport.

739. Do you remember the number of ships you were able to place at the disposal of the Government?—I cannot remember just now exactly, but we had eight or ten vessels there; ten, I think.

740. Do you suppose that the character of steamers which the railway companies would use, would be the same as would be required for national purposes on an emergency?—I do not think it would, generally speaking.

741. I think it was proved upon the whole an economy to the Government making use of the transports already existing?—A great economy.

743. I think that there was a Report of a Committee of the House upon the subject?—Yes.

743. It was proved, was it not, upon the whole that the using of transports is cheaper than the using of commercial vessels?—Yes.

744. You are afraid that if this principle was admitted, and if the railways could drive off the wholesome competition, then, in the event of a national emergency, we should be very much reduced in our resources?—That is my opinion, and further, at the present time, the coasting vessels furnish the Naval Reserve with recruits, I think that is of importance. We should, in all probability, be very greatly reduced in the number of coasting vessels, and those vessels would be employed and owned by the railways to such an extent as would serve their purpose; they would have no necessity to look after them much with regard to public convenience, therefore that branch of the public service would be interfered with.

745. Your attention has been directed to one Report of the Board of Trade, has it been drawn to one issued quite recently, in February 1862, upon the Lancashire and Yorkshire Railway; do you agree with the opinion that was then given, "The combined working of a railway with steam vessels may promote permanency and regularity in the sea service, and afford the convenience of through rates for the land and sea transit; but it is not to be overlooked that the powers in question, if given to a railway company possessed of a large capital, and having the control of all the railways leading to the port at which the powers are to be exercised, might have the effect of extinguishing all competition by other parties in the lines of sea service in which the railway company engage; and the result might be that the cost of the sea service to the public would be increased, and possibly the frequency of the passages and the accommodation afforded to the public in other particulars diminished?"—That is just what I have been arguing.

746. You differ from the one report, but you agree with the other, do you not?—Yes.

747. *Mr. Hodgson.*] Will you have the goodness to explain one of your answers—you were asked as to the accommodation that the Cunard line of steamers had afforded to the Government during the Crimean war. Did I catch your meaning correctly when I understood you to say that the Railway Companys' steamers would not be able to afford the same assistance?—Yes. I should think probably they would not.

748. Why?—Because the private individuals are obliged to keep a larger reserve of steamers than I think the railway companies would require to do.

749. Would not a railway company, having a steamer in connexion with its railways at each port, be obliged to keep supplementary steamers to keep up its traffic?—They would be obliged to keep up the traffic, no doubt; but I meant this, that a large concern like our own, spread over many places, trading to the Mediterranean and other places would always have a large supply of steamers. I have been arguing that the railway companies would sooner or later swallow up private enterprise.

750. *Mr. Hutt.*] You stated, did you not, that the South Eastern Railway Company makes a distinction in the case of passage-money for the through fares and passage-money simply from Boulogne to Folkestone.—Yes.

751. Are you sure that that is the case?—I am speaking quite generally, but I am pretty sure that that is the case.

752. Do you know that that is the case?—I think you will find it in Bradshaw. If you take a ticket at the London terminus here, and go through all the way (I believe the ticket lasts a certain number of days), it is cheaper than if you divided the journey by taking the railway down to Folkstone, and then took the steamboat separately.

753. *Mr. Adair.*] Are you aware that there is a steamer running once, if not twice, a week from London to Boulogne?—Yes. *George Burns*, Esq. 10 March 1864.

754. That is the case, notwithstanding this Folkestone and Boulogne service. It has been running for years, has it not, ever since the establishment of that service?—Yes, I am aware of that.

755. That steamer is the property of the General Steam Navigation Company, is not it?—I believe so.

756. Are they running it at a loss or at a profit?—I cannot say.

757. Have you heard whether it is chiefly for goods or for goods and passengers?—I have heard that passengers go by it. There is a class of passengers to whom the saving of money is a great benefit. No doubt passengers do go, but I suppose it is chiefly for the heavier description of goods.

758. That makes this service from Folkestone to Boulogne still an exceptional service as regards the transit across the channel, does it not?—I take it that it is exceptional only to this extent, that the railway company got their powers in the earlier days, when railways were not so much looked after, and when it was supposed that in order to the proper development of railways on both sides of the channel it was desirable to grant it, but I simply confined myself to this statement that there was no difficulty whatever in a private company supplying that link upon the sea, quite as well, if not better than the railway company should do it.

759. I think there are very few cases in which charters of limited liability have been granted to railway companies?—Very rarely.

760. There are only three or four, are there, among the steamboat companies trading under such charters?—I think so, and even those have not been able to pay.

761. That illustrates, does it not, the difficulty of competing with a railway company of large capital to whom Parliament has granted the power?—I do not lay any stress upon a company obtaining a charter of limited liability, because the capital and resources of any company trading upon the sea must be comparatively small to those of any railway, whether you take it either as regards an individual or a limited liability company, the railway company equally have the power of driving them off. Perhaps I may be allowed to add that, since giving one of my answers just now, I have been informed by my son, who is here, and is more conversant with the details than I am, that we do book through to different parts of Scotland. He will give details if required.

William Watson, Esq., called in; and Examined:

762. *Chairman.*] I BELIEVE you are Managing Director of the City of Dublin Steamboat Company?—I am. *William Watson*, Esq.

763. And you have been so for a good many years, have you not?—I have.

764. When was the City of Dublin Steamboat Company established?—About 40 years ago.

765. Originally it was established to carry on a trade between Dublin and Liverpool?—It was.

766. Since that time they have opened other lines, I think?—We have done so.

767. Did you carry the mails for many years, under contract with the Government, between Liverpool and Dublin?—We did for some years.

768. That was before the Holyhead Line was opened?—Before the Holyhead Line was opened.

769. When the railway was opened to Holyhead I presume that the service was transferred to them?—It was transferred, and the Government conducted it by their own vessels.

770. With their own mailboats?—Yes.

771. Did the Government, in 1850, give up running their own vessels?—They did.

772. Did they employ your company again.—They did, under contract.

773. Five years after did the London and North Western Railway Company, together with the Chester and Holyhead Company, obtain powers to provide an improved class of boats?— Conjointly with our company they did so.

774. Were they authorised to advance a sum of money for the purpose?—They were.

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775. What amount were they authorised to advance?—£400,000.

776. What was the first arrangement effected between the City of Dublin Company and the railway companies?—In the following year (1851), at their invitation, we commenced the through booking of passengers by these mail boats.

777. Mr. *Pollard Urquhart.*] By Holyhead?—Yes, by Holyhead.

778. *Chairman.*] With regard to the profits, was there an arrangement that the railway companies were to have one-half interest and the steamboat company the other half?—Exactly so; they were to have one-half interest in these boats.

779. How did that arrangement come to be altered?—It was altered after a short time, was not it?—Yes; there was a joint committee appointed upon the part of the railway companies and our company, consisting of those who were conversant with the machinery of steam vessels to enter into agreements with the Government, then anxious to improve the means of communication between London and Dublin; and upon looking into the thing closely the representatives of the railway companies seemed to anticipate that it would be a very difficult and a very costly service that the Government wished to have established. They thought a very large sum indeed would be necessary to remunerate them for the providing and working of these large and expensive vessels. The Government had previously intimated to what extent they were prepared to go in the way of an annual grant for improving the communication. The estimate of the railway company would have about doubled the amount that the Government were willing to give. On the other hand we thought that a less sum would be sufficient to provide the necessary vessels and work them; and we suggested to the Railway Company that if they would assist us with one half the capital necessary for the boats, which had been estimated to cost 300,000 *l.*, we would take charge exclusively of the sea service for a less amount, which they agreed to do. Upon that an estimate was formed, communicated to the Government, and accepted

780. Did it not end in this, that instead of your asking the railway companies for 400,000 *l.*, your Steam Packet Company found the whole capital except 37,500 *l.*?—Yes; the boats were to have cost 300,000 *l.*, but we thought it wise to enlarge them somewhat. They cost 360,000 *l.*, of which we provided all the capital except 37,500, which has been advanced upon the mortgage of one of the vessels under agreement.

781. I need hardly ask whether these are good vessels. They are reputed to be the best in existence for a short passenger traffic, are they not?—Yes, we say so, and I believe it is generally admitted.

782. In or before 1848 did the Chester and Holyhead Company obtain power to run steamers of their own between Holyhead and Kingstown?—In 1848 they did.

783. And they then commenced to carry passengers at through rates between London and Dublin, did they not?—Yes, and other places.

784. On an application from the Chester and Holyhead Company requesting you to convey passengers at the same through rates in their packets to Dublin, did your company state that they would comply with it?—We did.

785. Was that put a stop to by them?—It was put a stop to by the railway company about two years afterwards.

786. Did they give notice that the through booking arrangements were to be confined exclusively to their own boats?—They did.

787. Was that arrangement permanent, or did they resume the through booking?—After some interval of time it was resumed—after some years—and it has continued so up to the present time without any interruption.

788. Do you find any difficulty in through booking with the railway company? None whatever.

789. Is that confined to passengers and parcels, or is it extended to heavy goods and cattle?—It is confined at Holyhead to passengers and parcels. At present there are arrangements for the through booking of live stock and cargo at Liverpool in connexion with that railway company.

790. That railway company having no boats at Liverpool?—Yes, the railway company have no boats of its own at Liverpool.

791. Have you also, through booking arrangements with other Railway Companies coming to Liverpool?—We have.

792. Practically

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792. Practically, do you think that to the passengers the Packet Company, being independent of the Railway Company makes any difference?—None whatever that I can conceive, as far as facilities are concerned, and as far as payments are concerned, I do not think it makes any difference.

793. In short, you think that through booking may be carried on perfectly well without any amalgamation?—Perfectly well, and with no difficulty whatever.

794. You have heard the evidence of the former witnesses, have you not?—I have.

795. Do you concur generally in their objections to these powers being given?—Entirely. I concur in the objection to granting such powers upon the principle of confining the steam trade to the steamboat companies. We think, of course, that it is fair to parties who have invested their capital in steamboats not to put them in the position of being driven out of the trade, and having no other lines upon which to employ steam vessels.

796 Mr. *Kennaird.*—With reference to that competition which existed between the railway Company and yourselves for the Irish traffic of the Chester and Holyhead Company at that time had been a powerful company instead of being a company then in considerable embarrassment, do you think that with their power of through booking upon that line you could have carried on a competition for any length of time if that railway company had had powers to put on any number of steamboats?—No doubt, we could not have maintained the mail packets without a loss. For other reasons, such as for maintaining our position upon the Liverpool Line, we might have been satisfied to work at a loss; but I have no hesitation in saying that unless friendly relations had been resumed, those packets would have been worked at a loss.

797. Yours is a very large company, but do you think that a small company could have stood the competition?—If it had been a company simply owning those mail packets, certainly not.

798. If the railway company had put on steamers, and worked all its own traffic, having practically a monopoly of the land-traffic, could any independent company have stood the competition?—We had nothing to do with the goods upon that line, therefore, of course, we could not be turned out of a trade which we did not possess.

799. But if you had had it, would that have been the case?—No, it is unquestionable that no independent company could, in opposition to the wishes of the railway company owning the line to the port, have maintained a separate line of steamboats.

William Conway Morgan, Esq., called in; and further Examined.

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800. *Chairman.*] WHEN you were called as witness yesterday, you stated that you were not then prepared to go into the argument upon this question, will you now state what are the grounds of objection upon which you think that the power to hold and use sea-going steamers ought not to be granted to railway companies?—As far as I have been able to collect from the evidence of the witnesses who have been already examined, they have one or the other of them stated very fully the grounds upon which our association objects to these powers being granted. The main ground is that the railway companies having a monopoly on land, if they get power to own steamboats, would extend the land monopoly to the sea; whilst we, having no power of running on or alongside railways, are not able to compete throughout their lines on the same terms with them.

801. Have you heard the evidence of the witnesses who have been examined?—That of one or two, but not all.

802. I understand you to rest your case upon this: You do not complain of the competition of railway companies merely upon the ground of their having a larger capital than yours; but you say that they have a practical monopoly of the land traffic, that they have therefore the power of diverting that traffic, or of arranging it as best suits their own convenience, and that these are advantages conferred upon them by Parliament, and with which you do not think it just that you should be called upon to compete?—Yes, quite so.

803. That, as I understand is the substance of the case?—That is the substance of the case.

804. Mr. *Hodgson.*] Can you state any case in which any disadvantage to

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the public has arisen in consequence of these steamboat powers being granted to railway companies?—I think there have been two or three cases of such disadvantage.

805. What are they?—I think the case of the South Eastern Company is a case of disadvantage.

806. What disadvantage to the public is there in that case?—Simply as regards fares? at this moment the through rate to Boulogne *viâ* Folkestone is, I think, 1 *l.* 8 *s.* 6 *d.*, and the rate to Folkestone is 19 *s.*; the railway company, therefore, get 9 *s.* 6 *d.* for a sea passage of 27 miles—that is, more than 3 *d.* a mile for their passengers. There is not an independent steamboat company in the kingdom that charges anything approaching that for their first-class passengers.

807. Has the public the same accommodation in other cases as is given upon that passage?—I should say much better in some cases.

808. Do you mean that the passage is performed by more efficient vessels?—I will take the case of one company alone. Between Holyhead and Kingstown the service is performed by the City of Dublin Steam Packet Company's vessels; they possess vessels which are better sea-going ships than those upon the South Eastern line, vessels of superior accommodation and arrangements, and of superior speed; they are superior altogether and are a better class of ships.

809. And what is the fare in that case?—The fare is very much lower.

810. Are those vesels subsidised by the Government?—Yes; for the mail.

811. They receive a subsidy?—Yes; for the carriage of the mails.

812. Therefore they are not a parallel case?—To a certain extent they are; they are both mail-carrying companies.

813.—You complain that the fare between Folkestone and Boulogne is 9*s.* 6*d.*, I think?—Yes; either 8 *s.* 6 *d.* or 9 *s.* 6 *d.*

814.—Was that passage served previously to the establishment of the railway companies' steamboats?—Yes; by an affiliated company.

815.—What were the rates then?—I think 8 *s.* 6 *d.*; somewhere about the same thing.

816.—The public disadvantage amounts to 1s. upon the passage then?—I put it in this way, that an independent company could carry on the passenger trade between Folkestone and Boulogne at lower rates, and that they have not the chance of doing so.

817. Why do you say so?—Because the railway company would at once lower the rates and drive them off; but the railway company having the power under Act of Parliament, they could afterwards raise their rates and make them higher than the independent company would charge the public.

818. I want to know in what way you think that the public has suffered in consequence of these powers being granted to railway companies. You allege that the public has suffered an injury by the establishment of those vessels, do you not?—I think the mere fact of the South Eastern Company having these powers prevents the public deriving the advantage of low fares.

819. Then you think that the public do not derive advantage from those boats?—I am quite sure of this, that independent parties would put on as good steamboats and better.

820. Will you give me another instance, I am not satisfied with that?—The City of Dublin Steam Packet Company conveys passengers between Holyhead and Kingstown, and the London and North Western Company do so between Holyhead and Dublin; they have boats under their powers adapted for passenger and cargo purposes. I find upon looking at the Report of the Holyhead Committee of last year, that it appears in evidence, that some time since the London and North Western having raised their through passenger rates by the City of Dublin Steam Packet Company's vessel, the latter company proposed that these should be reduced. They refused to reduce the rates, and not only so, but in the course of the correspondence they asked the City of Dublin Steam Packet Company to raise the rates by their Liverpool and Dublin vessels, to enable them to raise their rates between Holyhead and Dublin.

821. How do you trace that to their power of running steamvessels?—The fact of the North Western Company having the power to own steamvessels by one route to Dublin, enables them to compete with the Dublin Company's boats by another route.

822. Supposing that instead of those steamboats having been put on by a railway company

company it had been another steamboat company which had put them on, would it not have been exactly the same?—No; because they would have nothing to fall back upon but the profits of the sea-service, whereas a railway company can lose as much as it likes.

823. In that case you think it has led to the raising of the rates?—In the case of the London and North Western Company they are enabled so far to control the rates.

824. Will you tell me another instance?—Those are two cases that occur to me; I am not aware of any other. I only mentioned them that the Committee may know that two railway companies, having got steamboat powers, actually work to the detriment of the public, in so far as the rates are concerned.

825. Mr. *Lygon.*] You do not mean that the South Eastern Company have raised their fares under any agreement, but they have charged a rate which you consider excessive?—Quite so. I find, upon looking at the rate for first-class passengers by the ordinary first-class vessels employed by independent companies, that the rate averages from 1*d.* to 1½*d.* a mile, whereas the South Eastern Company charge something over 3*d.* The City of Dublin Company are obliged to charge something over 2*d.*; I believe they could do it very much less if they were free to do it.

826. Mr. *Clay.*] Do I rightly understand that the rate charged by the South Eastern Company between Folkestone and Boulogne is higher than that charged by any steamboat company that you know of upon the mileage?—I am not aware of any independent company charging anything like such high rates.

827. Do you conceive that any company or private individual could, under ordinary circumstances, carry on the service between Folkestone and Boulogne with a profit, as well as it is at present carried on, at a lower rate than the South Eastern Company charge?—Yes, no doubt.

828. If any company or private individual were to try it, should you have any doubt whatever, from your knowledge of the way in which business of that kind is carried on, that the railway company would immediately lower their fares?—None whatever.

829. Have you also any doubt that the result would be that a newcomer must either give up the competition or be ruined?—I have no doubt of it; I may mention that there was a report the year before last by the Board of Trade upon some Bills that were submitted to it, and there was one last year also. The Report of 1862 expresses as clearly as possible our case; it is put hypothetically in the Report, but it is our case completely. As regards the subject of limited liability, that does not appear to our association to enter into the question. There is a good deal in the Report which touches it, but the main point is stated here: "On this subject my Lords observed in their reports on those Railway Bills of the last Session which contained provisions for steamboat arrangements. The combined working of a railway with steamvessels may promote permanency and regularity in the sea-service, and afford the convenience of through-rates for the land and sea transit." Upon that point, I think, the Committee have had a good deal of evidence to show that independent steamboat companies can give all that advantage. But then the Report goes on to say, "But it is not to be overlooked that the powers in question, if given to a railway company possessed of a large capital, and having the control of all the railways leading to the port at which the powers are to be exercised, might have the effect of extinguishing all competition by other parties in the lines of sea-service in which the railway company engage; and the result might be that the cost of the sea service to the public would be increased, and, possibly, the frequency of the passages and the accommodation afforded to the public in other particulars diminished." That is the whole of our case; it is put hypothetically here, but we consider it absolutely true.

830. Mr. *Hodgson.*] Will you turn to page 5, and read the first paragraph there?—The first paragraph upon the following page is the report of the succeeding year, and there the Board seem to have adopted the opposite view.

831. They answer themselves, do they not?—They object to their own report. They put two cases there.

832. Will you read the first paragraph on page 5?—The Board of Trade appear in their report of last year to a great extent to contradict their report of the year before. If their view is correct, and their recommendations carried out

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under paragraphs 1 and 22, there appears to be no case in which a railway company applying for steamboat powers should not have them conceded.

833. Will you read the first paragraph on page 5, because that is the answer to what you have been saying?—"My Lords conceive that until distinct mischief is shown to arise from the grant of steamboat powers in the cases in which they have been conceded, Parliament will not refuse to give the like powers, subject to the like limitations, in the same or in similar cases." It appears to our association that that is a direct contradiction to the preceding report, and it appears to us that it is a very hard case that, until we have proved that mischief would arise, the groundwork is to be laid for originating the mischief.

834. In another place the Board hold, do they not, that the extension of the privilege of limited liability to companies generally does create a difference?—In the report of Sir John Lefevre, in 1848, he laid great stress upon the distinction between railway companies and steamboat companies as regards the question of limited liability. Upon that point his objections seemed to have a great deal of force, because, with a few exceptions, no steamboat companies had charters of limited liability then. They can all have them now, and therefore there is no longer any force in applying those observations to the comparison between railway and steamboat companies.

835. Following out that argument, there seems, according to the opinion of the Board of Trade, to be no more reason why a railway company should not own steamboats than why a steamboat company should not own lines of railway?—Their first remarks apply more particularly to the ground of limited liability, which cannot now be sustained. But the Board go on to hold an untenable position: "In some of those memorials it is urged that railway companies ought to be confined to their 'legitimate' or 'natural' business, viz., carrying by railway. This argument need not, my Lords think, be noticed further than by observing that anything is the 'legitimate' business of a company, railway or other, which its members resolve and have or can obtain power to engage in." That, I may remark, is in opposition to the view of Lord Langdale in the case of the Eastern Counties Company in 1846, in which he pronounced that their application of railway moneys to steamboat purposes was altogether illegitimate.

836. Was not that a judgment upon the power which the Company had under an Act of Parliament, in which he said that the application of railway money to steamboat purposes was illegitimate? Was not his judgment guided by the Act upon which the railway moneys were raised?—That may be so.

837. Was not there this distinction between the judgment of Lord Langdale and the report of the Board of Trade, that in the one case the judge was deciding upon the law founded upon an Act of Parliament, and in the other case the Board of Trade are giving their opinion upon what ought to be the law?—The Board of Trade are giving their opinion that a railway company, having obtained the power of raising money as a railway company, may embark their money so raised in any other speculation, which we maintain to be contrary to public policy.

838. You do not mean that in the present state of things a company may legally use its funds which have been granted for one purpose by applying them to another?—By being allowed to become the owners of steamboats they virtually do so.

839. But neither Lord Langdale nor any other judge would have given judgment against them under those circumstances, would he?—I think that no judge would pronounce that to be their legitimate business what they did not in the first instance obtain powers to carry on. There is another remark in the Report which has struck us as not being capable of being borne out: "It has also been represented that, as the competition of railway companies with private shipowners would end in leaving the sea as well as the land conveyance in the hands of the former, it is a violation of the principles of free-trade to allow such competition to take place. It may be observed, however, that it is by no means obvious how those who hold this view reconcile with the principles of free-trade the doctrine for which they contend, viz., that the trade of carrying by sea should be free to all, except to a large and important class of carriers by land, that is, railway companies." We have never contended for a moment that railway companies should not have the power of carrying on a steamboat communication

munication by means of their shareholders, with independent capital; for instance, by a limited liability company, promoted by their shareholders, and trading in connection with the railway company: but we say that as they have a monopoly of the land traffic, we do not think that this ought to be extended to the sea. We think that it is not interfering with the doctrine of free-trade to oppose the concession of this power. We think that the granting of it would not be free-trade at all.

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840. Sir *Francis Goldsmid.*] Is there any mode of preventing a railway company from granting to a limited liability company consisting of their own shareholders, and to that extent in connection with them, the same preferences and privileges which you fear as likely to drive away independent companies?—In the first place, there is this difficulty, that the funds which a steamboat company would apply to the purposes of steamboats would be steamboat funds; in the case of railways they would be railway funds.

841. My question is, whether railway companies have not still the power of granting facilities to a company in connection with them; for instance, as to coming to their wharves, and as to the transhipment of goods?—They would have that power; we could not interfere with that.

842. Have you formed an opinion as to the charge at which, if the South Eastern had not the power of owning steamboats, an independent company could convey passengers from Boulogne to Folkestone as well as the South Eastern Company now convey them?—Judging from the instances which we see at present, I think they could convey passengers for from 1½ *d.* to 2 *d.* a mile, easily.

843. Mr. *Lygon.*] In correspondence with the tidal express trains?—In correspondence with the tidal express trains.

844. Mr. *Clay.*] That is about 40 per cent. below the present charge, is it not?—Yes.

James S. Forbes, Esq., called in; and Examined:

845. *Chairman.*] Are you the Traffic Manager of the London, Chatham, and Dover Railway Company?—Yes.

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846. For how many years have you held that situation?—I have been with the London, Chatham, and Dover Company for two years.

847. I suppose, previously to that time, you had had considerable experience in other capacities.—Yes. I was 16 years with the Great Western; after that I went to Holland as the managing director of the Dutch-Rhenish Railway; and in my capacity as manager of the Dutch-Rhenish Railway, and as manager of the London, Chatham, and Dover Railway Company (who have the boat services between Dover and Calais), I have had considerable opportunities of ascertaining the merits of this steamboat question.

848. I think your company was the first that obtained an unlimited power of taking steamers to and from any continental ports?—Yes. In 1860 they obtained powers; those powers were somewhat modified in 1861. They were confined then to all places upon the coast between Boulogne on the one hand and, I think, Rotterdam on the other.

849. Have you used those powers since that time?—We have used the powers between Dover and Calais. We conduct the Mail Service for the English Government, in conjunction with the South Eastern Company; they are joint contractors with us, but we do the service with our boats. We are also sub-contractors for the French Mail Service; the whole of that service is done by our boats.

850. Have you used your powers for running to Rotterdam?—No; for the reason that we found that for the Rotterdam and Antwerp traffic, Ramsgate would be altogether a more desirable port than Dover; and the object of our "Steamboat Powers Bill" of this Session (which is now suspended, awaiting the decision of this Committee) is to take additional powers to go from Ramsgate to Rotterdam.

851. Do you assent to a statement which has been made here, that your Bill of 1860 having been opposed by the Steamship Owners' Association, their opposition was withdrawn through inadvertence; are you conversant with that fact?—I am not conversant with that fact.

852. You have had three years' experience of the working of the powers granted to you in 1860, have you not?—Yes.

853. Have you any means of comparing your rates with those of independent

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companies for equal distances?—Yes, I have some means of comparison. I may advert to the evidence which I have heard given by the last witness, who is the only witness whom I have heard examined before the Committee. I may premise that the South Eastern and the London, Chatham and Dover case, as regards this question, is very much the same. The first observation I have to make about the rates for the Channel Service is that they are rates fixed in the Act of Parliament under which the steamboat powers are held. In the next place, in respect to the rate from London to Boulogne of 28 *s.* 6 *d.*, it was omitted to be stated that, over and above the mere conveyance of the passengers from London Bridge to Boulogne, that sum covers other services of an onerous and expensive character. I do not think I can do better than use the case of a passenger passing from London to the Continent in illustration of all the arguments which the railway companies I think will have to advance upon the matter. Some Honorable Members of the Committee will probably remember that, not very many years ago, any one wanting to take so simple a journey as from London to Paris had, first of all, to find his way to Dover. Being there, he would have to find his way from the railway station to the steamboat. His luggage could only be transported by certain privileged porters; he had then to make his arrangements for getting on board the boat. When on board the boat he had to arrange for the payment of his fare. On the other side he had to attend to the landing and examination of his luggage, and to pay for it—in fact, doing all the services now done by the railway company. The fee for embarking a single package charged by the Dover porters was 4 *d.*, and the fee for disembarking the same package by the Calais porters was 4 *d.* Those services are all now much more efficiently done without trouble to the passenger; he does not know that it is being done. He takes his passage to the place to which he wants to go on the other side of the water, and all those services are embraced in his fare. Further, the railway companies are under the responsibility when they receive luggage in London of undertaking to deliver it in Calais or Paris, as the case may be. Before those arrangements were made there was no such liability upon the part of the carriers. The system which was introduced (I am confining myself now merely to passengers and their luggage) first with respect to Paris was gradually extended to Brussels, and from Brussels into Germany. Now, as a matter of fact, a passenger can take a ticket in London for nearly every important city in Europe, for every place of public resort as far as Constantinople; I think that is as far as we have got at present. Therefore, the Committee will see the great practical advantages of that to the public. Apart from the great difficulties attending the break of journey, and those arising in consequence of the travellers having to make arrangements at each of these points (first of all at Dover, then on the passage from Dover to Calais, and then at Calais; the necessity of carriage to the end of the existing railway, the having to be transported to the station through the town, and so forth), the differences of currency were important, especially in going from London to Constantinople. All our rates of exchange are calculated. You pay your money in London, and that franks you through the whole journey with no trouble. You have a note of exchange, so to speak, which takes you through without trouble to the very end of your journey. You have no trouble about francs, guilders, gulden, thalers, or kreutzers: you have the whole thing in your pocket done for you, and, I may say, done for a very small addition to the ordinary rates. The whole additional charge which we English railway companies (who have taken all the labour of this upon ourselves, and have worked it out and overcome great difficulties upon the part of foreign companies in so doing) get is 1*s.* upon a passenger. The difference between the ordinary fare to Dover and the through fare is 1*s.*, which covers the embarkation and disembarkation of the passenger's luggage, the carriage across the Channel (because the 8*s.* 6*d.* rate does not include the carriage of the baggage), and the insurance of the baggage to the other side. Those are advantages which the public appreciate; because the complaint now is, though we have extended the arrangements so far, that we have not extended them far enough. People are beginning to think it a hardship if they cannot book to places of very minor importance beyond our present limits. My experience of the matter is that it would be quite impossible to give those advantages to the public unless the railway companies were in a position, by their own machinery and their own servants, to fill up the important link (I am speaking now as representing the Channel companies) of the Channel.

Channel. It so happens that I myself am managing director of a railway upon the other side of the water, having its terminus at Rotterdam, a very important town: from Rotterdam that railway company has established connections, I may say roundly, to all parts of Europe. Once in our station at Rotterdam you can go to St. Petersburg, you can go to Vienna, you can go to Frankfort-on-the-Oder, you can go to Italy, you can go anywhere you please: you have only to go to the station, pay your money and take your tickets, and all the rest is done for you. The break is between Rotterdam and, let us say, Ramsgate one way, and Ramsgate and Rotterdam the other. The Council of the Association of General Railway Companies (which includes 72 lines, and of which I am a member) have often discussed these matters. They are in exactly the same position upon the Continent that the English railway clearing-house system places the railway companies in this country; that is to say, they associate together for common purposes, and are subject to common laws. They have reduced their currency to a common standard, and their weights to a common standard. There is therefore a perfect organization existing upon the other side of the water, quite ready to put itself in communication with a perfect organization upon this side of the water, for the conveyance not only of passengers but of merchandise, which is much more important to the public, because that is where the steamboat companies fail. I say (and I have said it before several special Committees of Parliament, in evidence upon Steamboat Bills, and it has been practically without refutation; for although they have had an opportunity of refuting it, they have not done so) that the steamboat companies have no claim to the consideration of Parliament, because they have not kept pace with the spirit of the times. They have not carried out the various facilities which the altered circumstances of the times require. They have allowed the public to be most shamefully defrauded in a variety of manners. That is rather a wide statement, but I am prepared to prove it in detail. I say now, as I have said before the other Committees, that they come with a very bad grace to Parliament to ask for a monopoly and for special privileges, unless they can show that they have done everything which their duty to the public required they should do. Perhaps the Committee will allow me to deal with a special case, which I may mention by way of illustration. When I first went to Holland, six or seven years ago, I found this state of things existing:—A man, for instance, in Prague is in communication with a man in Manchester, or Liverpool, or London, with respect to his merchandise, and the question arises thus. He says, "I want either to get such and such goods from Manchester or London to Prague, or I want to send them from Prague to Manchester; what am I to pay?" It is quite impossible to ascertain. The business is conducted thus: the goods are collected at Prague, and are sent by this man, consigned to an intermediate agent, probably at the frontier at Bodenbach. The public must, practically, make all the preliminary arrangements, because before they can despatch these goods they must find out that there is an agent at Bodenbach, another agent at Mannheim, another agent at Rotterdam, and a steamboat agent at Rotterdam, to take those goods and forward them to London. Then there must be agents in London to get the goods from the steamboat to the shore, and to make arrangements for passing them through London to the customer at Manchester. The public have great difficulty in getting information how that is to be done, and the manner in which in this respect the public have been left unprotected by steamboat companies (although it is possible to arrange it, because the railway companies have succeeded in arranging it), has been such as, in the opinion of the railway people and I may say the public also, not to entitle them to any consideration.

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854. Do I rightly understand that you make the steamboat companies responsible for the want of accommodation upon land?—No; for the want of organization upon sea. I will illustrate that in this way. Assume goods to be brought by railway from Prague to Rotterdam. As we have now overcome the difficulties between Prague and Rotterdam, a man now knows the rate which he has to pay to Rotterdam; he knows that that payment will cover every service, and he can either pay it in his currency at Prague, or at Rotterdam in the currency there, without troubling himself about the exchanges. This was the state of things in the communication beyond Rotterdam, where the railway company's line ceased. The goods had to be consigned to an agent, from that agent to a middle-man, standing between

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the railway company and the steamboat company; because there is the Custom House agent, and somebody has to attend to the transit of those goods through the town of Rotterdam. Those goods are then handed over to the steamboat agent. If you ask the rate from Rotterdam to London, you will get a quotation, apparently very reasonable; but if you go upon that quotation, you will be most egregiously deceived; because, practically, you have to pay much more for shipping charges at the port of Rotterdam, and fees of all sorts. When the goods get to London the merchant would have to pay for taking them by lighters to the wharf, landing them, examining them, carting them through London to their destination, and have to pay at a rate which is altogether extravagant and unreasonable. I have many instances to prove it. The railway companies are in a position to organise that traffic completely: it is organised upon the other side of the water, and it is organised in England. And assuming that a railway company could run boats between Rotterdam and Ramsgate, for instance, they would stand in the same position as the railway company is in between Calais and Dover, having their own boats performing their own service, and administering it themselves. Everything is put on board their own steamers, and landed from their own steamers, and goes forward direct to its destination. Everybody knows under that system what he is paying for, and what service he is entitled to. There is this difference between railway companies and ordinary steamboat proprietors, that we are all under Parliamentary powers as to rates; whereas I defy anybody to ascertain (I have tried it myself many times) upon what principle the rates charged by the steamboat companies are based—between Rotterdam and London especially. As an illustration, of my argument I will give one or two cases which are very well known to my friends, the gentlemen interested in the steamboat matters, who are present. These are some cases with respect to which I have the papers with me. This (*producing a paper*) is a freight-note delivered with goods; it is rather old, being dated 1860, but I have some more recent ones. It is delivered in London with two cases brought by the steamboat; these are the charges, the freight having been prepaid from Rotterdam, and the sender being fully entitled to believe that that freight covered the charges in London. This is the sort of thing he is exposed to: lighterage 1 *s.*; landing, loading, wharfage, &c. 2 *s.* 8 *d.*; attending examination and agency 1 *s.*; that is 4 *s.* 8 *d.*: the freight is not stated here, but the boxes were very light. Here is another: a bale of hay, lighterage 6 *d.*; landing, loading, wharfage, &c. 1 *s.* 4 *d.*; attending examination and agency 6 *d.* Those are the charges as to which the public have a fair right to complain that they have not been protected; because, it is perfectly easy, there is nothing more easy, than for the carrying company to perform all those services for the public at a reasonable charge. There is no service here for which 4 *s.* or 5 *s.* is charged, which would not have been well covered by a charge of 6 *d.* or 8 *d.* I know that the answer has been, and I dare say will be again, to some of these statements, that the public ought to be left to take care of themselves, and that they are quite able to protect themselves. That is not really so, because here is a very good illustration. Dr. Hartmann's case is an excellent illustration of this; he was a gentleman who came over to the Exhibition; he is a professor at Minden; he went round by Calais, and took his carpet-bag with him; he thought it was better to send his ordinary luggage by the usual conveyance, that is steamboat to Rotterdam. These facts were brought to my knowledge by a very long correspondence with some of the German Railway Companies, to explain what appeared very excessive charges upon Dr. Hartmann's two boxes. Those boxes, I ascertained, were removed from a hotel near Blackfriars Bridge, I think, called Keyser's Hotel (to which some German gentlemen are very fond of resorting), and they were sent by steambort to Rotterdam; and at Rotterdam, according to instructions, they were handed over to the Dutch-Rhenish railway. The boxes weighed 50 or 60 pounds each. This will afford the Committee some idea of whether I am speaking too strongly or not when I say that the steamboat companies have allowed the public to be pillaged. The charges are—cartage in London, 3 *s.*; wharfage and lighterage, 2 *s.* 6 *d.*; entry, 2 *s.* 6 *d.*; insurance, 3 *s.*; bill of lading and stamp, 3 *s.*; clearing, 5 *s.*; postage, &c.; altogether the round sum of 1*l.*, or 12 guilders. Those charges accrued upon two boxes weighing a little over a hundredweight, sent from Keyser's Hotel, in London, to, I believe, St. Katharine's Wharf, but at any rate one of the Thames wharves. They were carried from London to Rotterdam for 3 guilders 60 cents.,

or

or 6 *s.*; that is a most extravagant charge. I have just now heard railway charges complained of, but I say that 6 *s.* for a cwt. of merchandise is a most extravagant charge. But that is not all. The railway station at Rotterdam is less than a mile from the point where the steamer lands its goods. Now I will read the charges in Rotterdam: "Examination costs, transport, passport, seals and caution"—those are entirely imaginary. Certain formalities have to be gone through by importers of goods in Rotterdam; but we have made arrangements under which goods can be conveyed from the vessel's side in transit, without a fraction of cost in transit, from the station to the Custom House. There is a place provided for them until they can be examined and sent away. Therefore you will see upon what grounds these items are charged—"Examination costs, transport, passport, seals and caution, 1 guilder; 80 cents,"—that is 3 *s.*; besides delivery and freight-note, 2 *s.* 6 *d.*; postage, 8 *d.*; assurance, 10 *d.*; (the railway company being the assurers in general);" declaration and expedition" (whatever that may mean), 1 *s.* 8 *d.*; commission for doing all this, 4 *s.* 2 *d.* So that Dr. Hartmann, on his goods reaching Minden, had to pay upon a freight of 6 *s.* between the wharf in London and the wharf in Rotterdam (itself a most excessive charge), 20 *s.* in London, and 18 *s.* 6 *d.* in Rotterdam. I undertake to say that everything that was done with respect to these two boxes, including every formality required by the law, would have been amply repaid by 5 *s.* Our charges in Rotterdam for taking the boxes from the ship's side to the station would have been under 10 *d.* I have more cases of that sort, but that is a good general illustration of the way in which the public have been treated by somebody. The steamboat companies say it is not by them, but it really is by them, because they have the power to stop that sort of thing if they chose to do so.

855. Who are those charges made by?—The plan is this: to get those boxes from London they employ a carman, who makes his own charge. They take them to a wharf; they employ a wharfinger, and charge so much for wharfage; they charge so much for entering the goods outwards; they charge so much for preparing the freight-note, and so much for putting the goods on board. And it is the same on the other side. They are handed over to the agent of the steamboat company, who lands them, and makes his charge for landing. It does not concern him to attend to them for one instant after they are on the wharf, for when once they are on the wharf, he arranges to hand them over to another agent, called the *expéditeur*, who makes his charges for receiving them; then the Custom House agent is employed, not really to do anything, because there is no necessity under the new arrangements, the goods being taken through; but still the charges are made, and so on to the end of the story. The company I represent abroad and the company I represent in England are thoroughly alive to the value of this business; it is growing immensely. The exports from Rotterdam are of a description which depends in a large measure upon the facilities which are given, of which a reasonable freight and speed in the transit are the two great features, because they are nearly all perishable goods. If I should not be wearying the Committee, I could give them some notion of what the character and value of that traffic is. I have here returns which I procured from the Dutch Government, and which are, therefore, likely to be accurate. I find that in one year, 1862 (I have not an opportunity of knowing the results of 1863), there were sent from Rotterdam to London 379,629 casks of butter, 22,000 bundles of canes, 124,256 cwt. of cheese, and 32,948 boxes of cheese. With regard to cattle, there were 20,120 oxen, 22,000 calves, 196,000 sheep, 12,000 pigs; of drugs a great number; of eels a great number. There were 520 tons and 57,000 packages of fresh fish, 3,000 packages of dried fish, 76,000 bushels of fruit, 15,963 bales of hides, 4,958 packets of hops, a great quantity of poultry, 11,000 *l.* worth of live plants, and quantities of other produce: amongst other things there were 5,058 chests and baskets of fresh vegetables, 15,505 gallons of wine in casks, and 44,421 chests of wine. A great deal of the produce, as the Honourable Members will have perceived, is of a perishable character, and it is very important that it should be conveyed with great expedition, and with great certainty. We are therefore going, subject to the decision of the Committee upon the general question, to ask Parliament to empower us to run steamboats between Rotterdam and Antwerp and Ramsgate, in order to cultivate that trade, and to give it facilities which it has never hitherto enjoyed, and to relieve the public from this system, which works, according to our conviction, most injuriously,

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injuriously, not only to the public interests, but to the interest of the carriers themselves.

856. Mr. *Hodgson.*] If steamboat companies could and would perform the duties of the sea-passage for a reasonable share of the profit, would railway companies be desirous to take it upon themselves, or would they leave it to them? —Within my own knowledge a powerful steamboat company was requested to undertake the service between Rotterdam and Harwich. Mr. Mosley will be able to speak more particularly as to this fact. A service was established between Harwich and Rotterdam. I gave evidence upon the Bill with respect to that matter, and I also advised the Eastern Counties Company in the matter; and it was stated in Committee by Mr. Mosley that they had made overtures to the General Steam Navigation Company to perform that service, which were refused. I do not think myself, I must confess, with respect to those Channel services, that the railway companies should be hampered with the necessity of agreeing to carry on a most important link of their service through the instrumentality of other people's servants, because, unless you have an almost despotic control over the arrangements, it is almost impossible that you can go on; that is especially the case where you have a mixed service of passengers and goods. Anybody who has travelled by the steamboats between Rotterdam and London will know how entirely the comfort of the passengers is sacrificed to the quantity of cattle which can be got on board, besides the quantity of vegetables and fish, and so forth, the fact being that the freight is much more important to them than passengers. I am quite satisfied that passengers would resist if it came from railway companies that kind of treatment which they bear from the steamboat companies. I myself have crossed from Rotterdam when the deck of the vessel has been so crowded with cattle that it has been almost impossible to move in any direction. That is a frequent occurrence. I say, if railway companies undertook the service, the public would require from them treatment of a very different kind from what they have had hitherto.

857. It has been alleged that not only steamboat proprietors but the public generally object to these powers being conferred upon railway companies; does your experience confirm that allegation?—Decidedly not; altogether the contrary. I think the public show, by the way they resort to these through communications, that they appreciate very much the facilities and additional comforts afforded to them, and the certainty (which is of great importance) that they get good service in return for what they pay. They know what they pay and what they expect; no man who travels by the ordinary steamboat companies knows either.

858. When you have been seeking these powers from Parliament, have you met, at any time, with opposition from the public?—No, never; it has always been the steamboat companies; the same parties have appeared on two or three Bills of this sort. We have had the same statement made over and over again; and I say to the Committee again that there has never been any attempt to refute my statement. At the present moment, or within a very short period of time, to my own knowledge, the ordinary facility of landing the passengers' baggage from the boats of the steamboat companies plying between London and Rotterdam, was not accorded to them; they had, for the putting of their luggage from the boat to the shore, to pay 4*d.* each package, which was a most outrageous charge. Again, in the rates of merchandise, there has been no certainty, no appeal, no standard of value; some things have been charged by the bag, some by the bale, some by the box, some by the cwt., and some by the foot. The public would not stand that at the hands of the railway companies, nor would the companies attempt it; it would not be convenient to work their business in that manner.

859. *Chairman.*] I understand you to contend that it is impossible for you to have through communication, and to make your arrangements in a satisfactory manner with the Continental companies, unless you have the control of the intervening sea-passage; that is your argument, is it not?—That is quite so. I may say, further, that only within a short time, I have had a deputation from the Belgian Government, which, as you know, works all the main lines in Belgium. Those gentlemen came to me expressly in London to confer with me as to the possibility of establishing a merchandise service between Antwerp and Ramsgate.

860. You have no power over the Continental railways, except that which arises

arises from voluntary agreement, have you?—No; but all the railways upon the continent, who are parties to the foreign clearing house system, that is the general union, are subject to our existing conditions; of course those conditions are subscribed and entered into by the delegates of the different companies, but, having once been entered into, they bind everybody. The only objection which the foreign companies would have to any intermediate machinery between them and the English railways, would be the impossibility of their having any sort of guarantee that all the regulations which they make from time to time would be adhered to.

861. What is there to prevent your dealing with an independent steamboat company, just as you deal with the independent continental railways?—We should find in practice very great difficulties; never, in practice, have I known a case in which a steamboat company could be worked in that way until it was practically merged into a railway company. I have had some experience, because the South Wales, which is now part of the Great Western Railway, when I was with them, established boats between Waterford and Milford Haven; though nominally a separate company, it was really the railway company, just as the Weymouth and Channel Islands Company, which is called an independent company, is practically the railway company. Unless you could take that position with steamboats, you must run a serious risk of having your service very much impeded. The question, as it appears to me, for the Committee to consider, is whether it is not better to admit the existence of this power, and to put the railway companies under fair and proper conditions as to their exercise of it, rather than leave them free to do what they certainly will do otherwise; it is not to be supposed that the Belgian State Railways and ourselves, knowing that a very valuable traffic can be cultivated to any extent, will allow it to perish or be taken into other channels, simply because Parliament do not give us the power to put on the boats; the machinery will be found in some way or other; I use that argument for what it is worth. It appears to me to be much better that the powers should be openly exercised under legitimate restrictions, than that they should be employed underhand.

862. You contend that an arrangement under circumstances of equal terms between a railway company and a steamboat company is impossible; that if the steamboat company is not owned by the railway company, it must at any rate be dependent upon the railway company?—They must be so intimate, that it would merge into positive dependency.

863. You further contend, that that is a state of things which, even if it is desirable to prevent, it is not within the power of Parliament to prevent?—It is not practically in the power of Parliament to prevent it; and as I have endeavoured to show the Committee, it would be most undesirable in the interests of the public. I think it would be a very great benefit to the public that these powers should be given, subject to the same class of restrictions as for other carrying purposes, are imposed upon railway companies. I do not think that any railway manager of experience would object to accept reasonable restrictions. Now steamboat proprietors are absolutely without restrictions in what they do; they have no maximum fares or tolls.

864. Sir *James Fergusson*.] The arrangements which you speak of are established abroad with the foreign railway companies as part of a through route, and have reference both to passengers and goods; they are not merely a wide-spread system of through-booking, I suppose?—Yes, for passengers and goods. We have extended our arrangements abroad upon very much the same principles as we have in England, under which, if you wish to send goods from London to Edinburgh, you can send them through one channel at a fixed price, and under certain fixed conditions; that is done abroad as it is done in England, and it only remains to bring those two systems together, and to have perfect control over the intermediate link, and then, instead of sending from Edinburgh to London only, you may send from Edinburgh to Vienna.

865. What difficulty is there in making the steamboat companies parties to the arrangements with the railway companies?—The difficulty appears to be this, that the interests of steamboat companies, so far as I have known them, have always clashed with railway companies' interest; for instance, if the steamboat companies carry on their traffic between Antwerp and London, they are committed to that business; they have their extensive premises in London; they have their agents, their lightermen, their bonded warehousemen, and all their machinery;

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machinery; and it is not to their interest to enter into any organization which would have the effect of removing that trade altogether to a new channel.

866. Were it not for that possible transfer of business, there is no more reason why you should not get through working arrangements to which steam companies should be parties between Harwich and Rotterdam, than upon a similar lengthened work of railway, of which Belfast or Glasgow might be termini, is there?—In the abstract there would seem to be no distinction, because, if the machinery is provided, it would seem not to matter whether it is in the hands of land or water companies. In practice, I have found it much easier myself to have it in our hands, because, supposing I have entire power over the machinery, not only to Dover but to Calais, if any question arises in London as to what is to be done between Dover and Calais, I settle it at once, and all the people being under my control, carry out my orders; but, on the other system, if there had to be a departure from the settled arrangements, it would involve a discussion with the intermediate interest.

867. It would be the same if there was an intervening link of railway system in the hands of a foreign company, though carrying on through-booking arrangements with you, would it not?—It would to some extent.

868. The incidental shipping charges which you quoted as of an excessive character were simply the result of the absence of any through booking arrangements, were they not?—They were the result of the absence of any through-booking arrangements, and of a very evil practice into which steamboat companies have fallen, of allowing a number of independent agents, so to speak, to do things which they themselves ought to do.

869. Supposing there to be an interval between two links of railway communication and no through rates to exist, there would be an opportunity for exorbitant charges in carrying passengers and goods over that link, would there not?—No doubt; and therefore I say it would be much better that Parliament should recognise the right of railway companies to bridge over the link, and that they should put them under the same restrictions which they do put them under as railway companies, that there might be some restriction upon the steamboat services; now there is absolutely none.

870. Mr. *Adair.*] Does your company charge a passenger, who goes on board your steamer at Dover and goes to Calais, the same fare which you charge a passenger coming from London and going to Brussels or Antwerp; what is the amount?—Eight shillings and sixpence in each case.

871. What means has the passenger of ascertaining that he is not charged more than a man taking a through ticket from London to Vienna?—We do not show the divisions of the rate.

872. Do you know the 30th Clause of the Railways Clauses Act of last Session?—I am afraid I cannot remember it at the moment.

873. That is the clause which requires you to state upon the ticket how much is charged for the land transport, and how much is charged for the sea, in order that a person who has not used your railway may know that he is not charged more for your steamboat service than if he had. Would you consider that to apply to your company, it having obtained its powers before the Act was passed?—I really have not considered the matter at all, but I should very much like to be exempt from the operation of that clause for a reason which I hope you will think sufficient; these rates and regulations as to through-booking are only arrived at after bringing a great many people into harmony. I am speaking of the tickets beyond Calais now: it is easier to Calais; the process is this: We print the tickets in London; if they are for Germany, we print them in English and German; if they are for France or Belgium, we print them in English and French; they are the coupon books, with which I dare say honourable members are familiar; then they have to be stamped before they are issued by each Government over the lines of which they pass. They are stamped here; they are stamped by the Belgium Government, for Belgium, and by the French Companies for France. They cost from 9*d.* to 1*s.* a piece, before all this has been gone through. To print the fares upon the face of these tickets, those fares being subject at the option of many interests to revision from time to time, would involve some practical difficulties; that is why we do not, usually speaking, print the details upon the tickets. With respect to Calais, of course, the objection would be very much less. I do not see, in fact, any very strong objection to printing the railway fare as distinguished from the sea fare.

874. Supposing

874. Supposing that your Company obtaining the powers which it is seeking, to run steamers from Ramsgate to Rotterdam, what arrangement will you find it necessary to make with the Great Eastern Company, who have already the power of running to Rotterdam, with regard to fares and freights on the service from London?—I think it is most likely that we should agree as to the throughout charges.

875. Both companies would charge the same?—I think so.

876. Whether the land carriage was longer or shorter?—Yes.

877. Do you anticipate getting a large share of that traffic?—There is an enormous traffic which is continually growing; I see no reason to doubt that we should get a very large share of it.

878. Which would be the shortest route?—I think the routes are practically the same.

879. Have the Great Eastern Company the same arrangements with the Dutch, Rhenish, and German Companies, that you have?—They have; but one of our proposals is to run to Rotterdam, and the other to run to Antwerp; at Antwerp there is a very important class of trade, the Swiss and Upper Rhine Trade is carried on more there than through Rotterdam.

880. In fact, if amicable arrangements continue between the Great Eastern and your company, the one running to Antwerp and the other to Rotterdam, there would be no possible competition by which the public could be advantaged?—Only the competition between the steamboat companies, and the railways working together.

881. But there would not be a third party in a great and powerful railway company introduced as a competition for the service of the public in running to Rotterdam?—We are entirely sincere in our intention of running to Rotterdam.

882. I understood you to say, that one company would run to Rotterdam and the other to Antwerp?—No; I said that the companies competing between the two parts, would compete upon certain recognised terms, and there is traffic enough for both of us.

883. When the half-yearly statement of the London, Chatham, and Dover Company is made to their shareholders, do they give a separate statement of the earnings and expenses of the company's steamboats, or is it all in one general statement?—It is a separate statement.

884. There is a debtor and creditor account for the sea service?—Yes.

885. Mr. *Algernon Egerton.*] You complain, as I understand, that the line of service from London to Rotterdam is badly worked, in respect principally of through-booking arrangements?—Yes.

886. Do you consider that to be a sample generally of the way in which steamboat companies work their traffic?—My knowledge is confined very much to Rotterdam and Antwerp; I may say, my opinion is that to those two important places, that is a fair sample of the way in which it is done.

887. Have you heard the evidence of some of the previous witnesses?—Only the last.

888. Did you hear Mr. Burns, at the end of his evidence, say that the firm with which he is connected, has through-booking arrangements with various foreign railways?—I did not hear him.

889. Will you look at this list of them (*handing a paper to the Witness*)?—I have done so.

890. You are connected with a German railway, are you not?—Yes.

891. Have you not some arrangement with a line of steamers from Rotterdam to Liverpool?—Yes.

892. With through-booking arrangements to the Continent?—Yes.

893. Has that worked satisfactorily?—Upon the whole it has.

894. Do you think that those arrangements would be improved by your having some control over the independent company with which you have at present arrangements?—I think it would; we have great control over them, from the fact that one of the leading men in that concern is also deeply interested in our railway on the other side of the water. I think that, but for that, we should have had more difficulty in working this matter than we have done.

895. With reference to the general principle, I understand you to say that you think that powers should be given to railway companies to put on steamers whenever and wherever they please, and to whatever ports they please; in short,

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that they ought to be treated like other companies or individuals; is that so?—I do not know that it would go quite to that extent, because railway companies, when taking those powers, are obliged to go before a Committee of Parliament, and to make out their case. I would say that whether it be or be not wise to give them such powers must depend entirely upon the evidence which they adduce in favour of that application before Parliament. My impression is, that wherever a large traffic exists with a railway upon the one side of the water, and that traffic can be transported to a railway upon the other side of the water, it is to the interest of the public decidedly that the railway companies, between them, should be enabled to fill up that link by their own machinery.

896. In fact, what you would recommend may be called an extension of the ferry system, may it not?—Exactly, an extension of it to some of the North Sea ports; Rotterdam and Antwerp, for instance. I am not sure whether we should not extend it to Hamburgh upon the same system which has been found so extremely beneficial in the case of the traffic from London to Paris and London to the Continent, *viâ* Calais; that is now limited very nearly to passengers and their luggage. I am satisfied that the public would be very great gainers in facility and in security.

897. Mr. *Kinnaird.*] Continuing what you have stated with regard to the Rotterdam traffic, I understood you to say that the Great Eastern Company have at present the power of running steamers to that port, and carrying goods?—Yes, they have the power.

898. You contemplate trying to obtain the same powers yourself, do you not?—We have gone to Parliament for powers for the same purpose; but from Ramsgate. The Great Eastern Company go from Harwich.

899. Goods are now partially carried by independent steam companies, are they not?—Very largely, indeed.

900. If Parliament did grant, as they have done to the Great Eastern Company, power to your company, is it not possible that the two combined together might run at such rates, backed as they are by large capital, as to make it impossible for the existing small steam companies to carry on the trade?—The existing steamboat companies are not so very small; they plead that sort of thing, and talk about the gigantic bodies of railways, but they are a very powerful organization.

901. Still are not two railway companies with steamboat powers very great competitors at all events?—No doubt the competition would be severe.

902. And the result not doubtful?—I think the result would not be doubtful, unless the steamboat companies adopted a course altogether different from their present course.

903. What is the date of the London, Chatham, and Dover Company's getting their power to own steamboats?—The date of the London, Chatham, and Dover Company's original power was 1860; that was to run to any North Sea port; this power was limited in 1861 to Boulogne on the one hand, and Rotterdam on the other.

904. How long have the South Eastern Company been in possession of steamboat power to run to Boulogne?—I think it was somewhat anterior to that; I hardly know the date.

905. I think when you went to Parliament to get this power they opposed you?—They opposed the change very strenuously.

906. I suppose the Committee before whom you appeared were under the impression that they were giving to the public the advantage of competition?—I assume that that was one of the reasons which influenced their decision.

907. I believe that some of the evidence which you called was that of some of the independent steamboat companies to support the Bill?—Yes; I was not a party to that.

908. It is on record in the office?—Yes.

909. The impression of the Committee was that they were granting a new power, so that there would be competition in the service between France and England?—Yes.

910. Now it is your boats that carry the whole traffic, is it not?—Yes.

911. How has this wonderful change been brought about?—By arrangement; for although we were not at all insensible to the advantages which the public derive from having two routes, we were also not insensible to the importance of protecting

protecting ourselves; but if the Honourable Member suggests that the public have been deceived, and that they have not derived any benefit from the passing of the London, Chatham, and Dover Act and the establishment of another route, I believe he is under a misapprehension.

912. I believe you have agreed rates, and you share in the joint traffic?—Yes.

913. And though the London, Chatham, and Dover Company does not really carry above one-fourth of the passengers, you get all the benefit, do you not?—We have done what appeared a very wise thing to do, instead of running at very low rates, and entering into competition, we agreed upon rates with the South Eastern; they conduct the services between London and Paris, *viâ* Folkestone, and we do it *viâ* Calais. The reason why that was done was that the London, Chatham, and Dover Company had become by arrangement really the possessors of the mail contract between Dover and Calais; and we thought it was a pity that, the circumstances being exactly the same, two trains running to one point to their boats, those boats meeting one train starting from one point on the other side of the Channel, the public should have all the disadvantage of having to find their way to two boats instead of one, and that the companies should be put at a disadvantage without any corresponding benefit to the public, but rather the disadvantage of the possibility of getting on board the wrong Company's boat, and having to pay over again and so on. Therefore we thought it would be more convenient if we combined under circumstances which left the public considerable gainers in price, considerable gainers in speed, and considerable gainers in the number of opportunities which are presented every day to them to pass between London and the Continent.

914. How is it managed; the two companies divide equally, do they not, the whole profit of the carriage across the channel?—We do.

915. So that practically in one sense, so far as competition is concerned, it is an amalgamated company?—Yes, an amalgamated company.

916. What would prevent the same facilities as those which you have been describing as afforded by a through ticket being given by a private company; you and the South Eastern were opposing companies for the sea traffic, but now you have come to a perfect understanding, and the public, according to your account, is benefited, though you, owning independent steamers, are doing the work for the South Eastern Company also; what difference is there between that state of things, and your being a private steamship company; you have separate powers, have you not?—Yes, only our interests in that matter are so precisely identical that there is much less likely to be a difference of opinion arising upon the conduct of the service than if one of us was a steamboat company; and in that service we are so entirely tied by circumstances that whether we would or not we must agree. These are the mail services to begin with; we are bound to the Post-office; we are bound to meet particular trains on the other side, and the link between Dover and Calais is filled up with special reference to the fact that you are bound on both sides, and therefore the opportunity of a difference of opinion upon the convenience of working, and so forth, does not arise.

917. Are you not aware that the traffic with Ireland is conducted by the City of Dublin Steam Packet Company?—Yes.

918. Have you ever heard any complaints about the difficulty of booking through by that wonderfully quick service to Ireland?—That is a very good service; that is a mail service, and somewhat analagous to the channel service. The Post-office in making their arrangements between the Railway Companies and the steamboat proprietors, could overcome any difficulties, which if the railway and steamboat proprietors were left to themselves to overcome might be difficult of solution.

919. Are you aware that the Irish Clearing House admits steamship companies?—Yes.

920. Why should not the continental railway do the same?—There is no reason, apparently, why they should not. As an answer to an earlier question as to whether private individuals could not do for the public all which we say we will do, I may say, certainly, the opportunity exists, but they have never availed themselves of it, and they are only going to be good when the railway companies come to seek for those powers.

921. You spoke of the great advantage to a man going to Prague of booking through; does it make any difference to him whether the sea link is filled up by

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a railway or an independent steamboat company?—No; he is perfectly insensible as to who conducts the trade, but he is very sensible of what he has to pay for it.

922. It has been stated that there is no safety, if railway companies have these powers, against their raising their fares, if they have no competition; is that borne out by your experience?—We have power to raise our fares up to the Parliamentary maximum, and not beyond; but after all, the publicity with which railway business is transacted is so much greater than that of an ordinary steamboat concern, particularly of private proprietors, that there is no comparison between the facilities of control in the two cases. I have had to do with making rates in all countries, and amongst all sorts of companies, but as a matter of experience, I say that I could not find my way amongst the steamboat companies, and gave it up in despair. You cannot say that of railway companies; there you can ascertain what you have to pay, and what you have to do.

923. In the case you gave, at the beginning of your evidence, of the two boxes, was not the reason of the overcharge that they were sent by the wrong channel; there is a direct steam communication from London to the point you mentioned, is there not?—They were sent by express order through Rotterdam, and consigned from Rotterdam by the Dutch Rhenish Railway; that is how I knew about it.

924. There is a cheaper mode of conveyance of goods of that sort from London, if it had been properly taken, is there not, which is at the same time safer and more expeditious?—Yes, they might have gone to Hamburgh. I think my experience of Hamburgh would enable me to me to say that at Hamburgh they would have been subject to much the same charges as they were at Rotterdam.

925. In your railway experience, have you never had complaints of persons being enormously charged, and when you came to inquire, you have found that the goods have been sent by a fast instead of a slow train?—Yes, of course.

926. Do you remit the overcharge to the public in such a case?—I think generally we deal liberally with the public in such a case. If we find that through misapprehension, or stupidity even, a man has taken a box to the parcels' office and not booked it rightly, we generally remit the difference.

927. You would not mention those cases as a proof of the grievous tax we suffer from railways?—I must take exception to the way in which you put the question, because this is not a solitary accidental case; it is a system. The question of whether it is a cheaper or a dearer route does not arise at all. The goods were sent to Rotterdam, and a freight of 6 *s.* was charged upon them. I do not complain of the freight, though I say that 6 *s.* a cwt. is an excessive charge. I say that, because I hear witnesses saying that railway charges are excessive. What I do complain of is, that upon the charge of 6 *s.* for carrying across the sea—I think it must be nearly 200 miles of sea—there should be 1 *l.* charged for getting those goods to the ship in London, and 18 *s.* 10 *d.* from the ship in Rotterdam for a distance of one mile. I say that that is perfectly unjustifiable. I am sorry to say that that is not an exceptional case.

928. Do you contend that that charge is usual for boxes going that way?—Yes; I contend that those charges may be called customary. A great number of small charges, which in the aggregate become a very considerable sum, are made, which ought not to be made, because they represent no service done.

929. As a fact, the person sending those boxes could have sent them much more cheaply by another mode, could he not?—I of course, as a carrier, am well versed in different modes, but a learned professor from the University of Minden is not likely to be very deeply learned in that.

930. A learned professor at Minden does not know the difference between a luggage train and a fast train, and he would be likely to commit the same mistake, in consequence of which I have often had to pay an extra charge. This year from the Highlands, upon one box, I had to pay 1 *l.*?—That might be so.

931. Mr. *Lygon.*] With regard to traffic between Dover and Calais, are the arrangements of the South Eastern Company permanent arrangements, or only arrangements for a term of years?—It is an arrangement in perpetuity.

932. Mr. *Clay.*] The rate between Folkestone and Boulogne, whether high or low, is that fixed by Parliament, is it not?—Yes.

933. I presume that Parliament fixed a maximum, and a minimum rate?—Yes, it is the maximum rate.

934. With regard to the freight notes, and the stories you told us about them, I think

I think they have been in Committee-rooms before; they look well used. I think the story of Dr. Hartmann and his boxes is one which we have had in the House of Commons before?—Yes; it was an illustration of the same thing, of which I have other examples.

935. It is fair to presume, is it not, that those stories were picked out as the most remarkable instances you could find of mismanagement?—Yes.

936. If any one was to bring up all the stories of all the inconvenience to which the public has been exposed from the mismanagement and carelessness of railway companies, if stories were told how a passenger has not been allowed to get out at the station he wished to go to, but has been carried a long way beyond, and forced to come back, or given the choice of going by road, or waiting for the next train, should you think that a fair illustration of the railway system?—No, I should not.

937. It was stated by one witness whom we examined, that a system of through-booking, as perfect as such a system can be, has been for some time at work from the districts of Yorkshire and Lancashire through Hull and to the Baltic, and most of the principal places of business in that part of the Continent, are you prepared to contradict that evidence?—I have not heard it; I know that the system is in existence.

938. The evidence was to that effect, that a system of through-booking, working exceedingly well, had been established?—I know the fact that there is through-booking, but I speak more now of things coming under my own knowledge.

939. You are not prepared to say that that system is a failure?—Not at all.

940. I think you have told the Committee that if Parliament should not grant these powers to railway companies, the railway companies would find some way, so to speak, of avoiding the law, and that, therefore, it would be much better that the power should be given to them, coupled with some restrictions, I presume to avoid unfair competition, and the practical establishment of a great monopoly, as Parliament might think fit?—I think so.

941. Should you consider it fair, as a railway company coming into competition with private steamer owners, or a steamboat company to run your boats for a considerable time at a loss; it is a thing that has been done in many other trades. Should you see any great objection to doing that if you were in competition with a steamboat company?—Looking at a railway company as a simple trader, I really cannot understand why the company should not be allowed to exercise its judgment as a private trader does, and if it is legitimate for a steamboat company to run at a loss to attain an end clearly before them, I cannot see why a railway company should be prevented from doing so.

942. Should you consider it a legitimate competition if by means of your railway, especially if you were also the owners of docks, you threw any difficulties or impediments which it was in your power to throw, in the way of a line of steamers running in competition with you?—I do not think it would be a competition that would be very likely to arise.

943. Whether that is the case or not, do you think that it would be within the limits of fair competition?—I do not think it would.

944. The running at a loss you consider is within the limits of fair competition?—I know that railway companies are sometimes obliged to do it upon their railways.

945. As to the restrictions which you think Parliament might impose, in case the powers were granted, you would not object to any restrictions having for their object that you should give the same facilities to your competitors as you have yourselves; would you?—That is a part of the railway law of the country.

946. But you would object to anything that should oblige such a publicity of accounts as would show, supposing Parliament were to disapprove of that system, that you ran your boats at a considerable loss?—We publish our accounts, and I think publicity in that matter is best for all parties concerned, the railway company and the public.

947. Although you are quite of opinion that these powers ought to be granted to railway companies, and that railway companies will find some way of making use of them, even if Parliament does not give them, you think that they may be accompanied with certain limitations?—I think that the powers which railway companies have as carriers upon land are subject to certain limitations by Parliament, which limitations have as their object the protection of the public. No

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railway company could fairly argue that the same limitations as to sea carriage should not be imposed upon them, nor need they fear it.

948. If railway companies have found a means of evading such a broad prohibition as that they shall not be practically the owners of steamers, what possible security can Parliament have that the railway companies would not equally find some means of avoiding the very much finer distinctions of the special limitations which you yourself think Parliament might feel it right to impose?—At all events the courts of law have their terrors for railway companies; the public would be in a much better position, because they would have it in their power to appeal to a court of law; they might appeal about certain conditions and limitations; now they have no such position. You cannot raise the question with a steamboat company as to freight or charges, or anything else.

949. Then you object to a railway company owning steamers where they have no powers, if I understand you rightly?—I say that the public would have the benefit, supposing you grant the powers to the railway company under limitations and prohibitions, apart from the advantage of competition, that the powers so granted to a railway company can only be exercised within the law.

950. You told us, as I understood, that if Parliament did not give those powers to the railway companies, they would find some underhand way (I think that was your expression) of exercising them?—Yes; I put it upon the general principle; it is better to have a thing done openly which is likely to be done.

951. My question is if railway companies can avoid so broad and evident a prohibition as that, what security can Parliament have that it can place any limits upon the dealings of railway companies in this matter, which the railway companies would not equally find some means of evading?—I think I have answered that already.

952. Sir *Francis Goldsmid.*] I think you mentioned that you contemplated establishing a complete and efficient system from London to different parts of the Continent; did I understand you that that system depended upon the power which you seek of owning steamboats being given to you?—Yes, entirely.

953. I think you also mention, in answer to an Honourable Member, that the General Steam Packet Company had been invited to establish a line from Harwich; had you, before coming to Parliament, given any similar invitation to a steamboat company to assist you?—No, because we are already large steamboat proprietors ourselves, and we almost possess the requisite machinery now for exercising this power, and in principle we think it much better that the railway company by their own machinery should carry on that business; and knowing the ill-success which attended the efforts of the Great Eastern Railway Company in the negotiation with the Steam Packet Company, we were not disposed to enter into any negotiation of that kind.

954. You made no such attempt?—We made no such attempt.

955. I understood you to mention among the difficulties of transmitting goods from Prague to London agencies upon the Austrian frontier?—Yes.

956. And agencies at Maunheim, and so on?—Yes.

957. Did I understand you correctly as imputing those difficulties as faults to the Steampacket Company?—No; I was illustrating the great advantage to the public which had resulted from railway companies taking into their hands the duties which before had been divided amongst many parties; but I said that by their machinery, the railway companies now brought down to the coast goods from Prague at a fixed price, all services included; but that when they got to Rotterdam, their functions ended, and a similar state of things existed to what before existed throughout the route.

958. Those difficulties are all overcome, are they not?—Yes, by a combination of railway companies, who do the whole of those services themselves.

959. You mentioned, I think, that your charge for making all those arrangements, was only 1*s.* beyond the ordinary charges for the passengers as far as Calais?—Yes, as far as the Custom House at Calais.

960. You also mentioned Constantinople, as illustrating the great extent of your arrangements; can you tell us what your charge is to Constantinople?—I cannot indeed.

961. It has been stated by some witnesses, by one witness, if not more, that the charge for conveying the passengers from Folkestone to Boulogne was unusually high, as compared with the charge for the conveyance of passengers for

for similar distances elsewhere; I think you said that your charge from Dover to Calais was the same as that from Folkestone to Boulogne?—Yes.

962. Are you prepared to contradict that statement, that the charge is unusually high as compared with that of the other packet companies conveying passengers for similar distances?—No doubt it is a high charge, but not having regard to the nature of the service; it is a mail service which has to be conducted at great speed, and at hours which involve not the best and most economical arrangements; in respect of the number of boats too, it has to be carried on altogether independent of economy of charge; for instance, we have a service from Dover to Calais, and a return service from Calais to Dover; if that were regulated by ourselves, and not by the Post-office, we should regulate it so that the same boat could come back again; that we cannot manage; the interval of time is so limited, that we are obliged to have two boats, instead of one.

963. Do I rightly understand you to say, that the passengers in part pay for the transmission of the mails?—Yes, they pay for the necessities of the service; they pay very willingly; at all events, we never have any complaints.

964. Mr. *Pollard Urquhart.*] In cases where it is possible for railway companies to effect a convenient and amicable arrangement with steam packet companies, do not you think that the concession of the powers sought by railway companies would be a great inducement to the steamboat companies to enter into such arrangements?—If other interests do not militate against such a thing, I could hardly myself, for instance, conceive (I have made use of the name of one company, because it is an important company trading between London and Rotterdam; I will continue to use it) a state of things to arise which would make the General Steam Navigation Company very willing to enter into a combination with railway companies. We propose to open a route which is altogether a competing route. If it were a mere question of bringing the traffic up to London, where the General Steam Company have already their establishment, and to carry the traffic from London by their boats to Rotterdam to the railway, then very likely the General Steam Navigation Company would enter into an arrangement. But I can hardly conceive that they would be very ready parties to an arrangement which has for its object to take the traffic from London by railway to the coast, and put it upon an entirely new line from the coast to the Continent.

965. Are you aware that the London and North Western Railway Company, and the City of Dublin Steam Packet Company, have entered into arrangements which are satisfactory to all parties, the public included?—Yes.

966. Do you not therefore think that the concession of these powers would be an inducement to enter into any like arrangement. I speak generally, not of your own case?—I think the concession of these powers to railway companies would certainly put the railway companies in a far better position in their negociations with the steamboat companies, for this reason, that we know that threatened competition is attended with beneficial results.

967. Not merely a competition, but the possibility that it might exist, would be an inducement to steamboat companies to enter into arrangements if the powers were granted to you?—Yes, if it were a question of negociation with the General Steam Navigation Company to carry on the trade between Ramsgate and Rotterdam, I should find myself much better off if I were armed with a power of putting on our own boats, than if I had no such power; indeed I know that without such power I should never get them to listen to me.

968. You mentioned a number of petty charges accumulating to a great deal; do you not think the account-book of every traveller's courier would show very much the same state of things?—I am afraid it is practised to a large extent.

969. You know that, in the case of travellers upon the Continent, the petty charges to which we were subject before through booking was adopted amounted to something serious, did they not?—They are a serious expense to travellers, and particularly unprotected travellers, because the steamboat companies have discretion enough to discriminate between the initiated and the uninitiated. Dr. Hartmann's case has been heard of before in Committee-rooms. But I will illustrate my last proposition by a more recent case; it is a case which occurred to myself. I was in Copenhagen last summer, and being there I bought some things, and not wishing to be troubled with them, I handed them over to an agent, and begged him to send them to London; on my return I found the two small boxes delivered, or rather the notes delivered, from the steamboat agent in

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London, and they very frankly set out all the charges; I dare say they did not recognise me in my public capacity, or I should have had it in a round sum. The whole of the charges from Copenhagen to Hamburgh were 10 *s.* 6 *d.*; from Hamburg to London they were also 10 *s.* 6 *d.*, for they deal in round sums; that makes a guinea. The charges that would have been made to me in London, if I had not known, were 2 *l.* 7 *s.* 6 *d.* upon a freight of 1 *l.* I sent down to the gentleman from whom I had received this consignment note, and told him that I strongly objected to the 15 *s.* for clearing, and 10 *s.* for cartage where there was no cartage; he was kind enough to say, "Well, you are in the ring, and we will knock it down to 17 *s.* 6 *d.*

970. You think travellers in general may thank the system of through-booking for having saved them very much from the roguery of their couriers and others?—Yes.

971. If you got the power which you seek under your Bill, you would be able to carry it still further?—Yes. I may say that the advantages are much greater in respect to merchandize than in respect to passengers and their goods, because there are a number of complicated things to be done in respect of merchandize which have not to be done with respect to passengers or luggage.

972. Slight charges of this sort might make the difference of profit or loss upon a transaction, might they not?—These small charges are a very serious tax upon commerce.

973. Would railway companies be likely to run steamers at a loss when existing steamboat companies were ready to enter into amicable arrangements, as the City of Dublin Steam Packet Company and the London and North Western Company have done? When it can be done to the advantage of all parties, would not railway companies rather resort to that mode than run at a loss?—I hope that railway managers are open to the same considerations as those which influence the other part of the community; when they can make an amicable arrangement to do the business without incurring a risk, they would rather do so than incur a risk themselves. But you may depend upon it that in our case there is no probability whatever of any existing steam-company being ready to put on steamers between Ramsgate and Rotterdam or Antwerp.

974. Mr. *Kinnaird.*] Under your agreement is not there some provision that the South Eastern Company shall not run steamers to Calais or from Ramsgate to Rotterdam?—Yes, that was an arrangement rather imposed upon us by the authorities at Boulogne; they objected to our running to Boulogne.

975. Practically it is so, is it not?—Yes. This is the arrangement, that the South Eastern Company work the steamboat service between Folkestone and Boulogne, and that we work the steamboat service between Dover and Calais; and the result of that to the public has been that now you can take a return-ticket in London for Calais, and may come back at your choice by either route, or you may go to Boulogne and take your choice to come back by either route; you may take a return-ticket by either line as suits your convenience, and come back by Dover or Folkestone, as you think fit.

976. Have you not also included the service between Ramsgate and Rotterdam, in order to get these powers?—No; it is limited to Dover and Calais at present.

977. I think you expressed an opinion last year that if such an arrangement was made, the practical result would be that the independent companies would be swept away?—I think it was put to me in much the same way as an Honourable Member put it this afternoon, that if these competitions took place, the result would not be doubtful; and I said last year, as I did to-day, I think it will not be doubtful unless the steamboat companies do differently from what they have done before.

Robert Moseley, Esq., called in; and Examined.

R. Moseley, Esq.

978. *Chairman.*] I believe you have been Traffic Manager to the Eastern Counties Railway Company for some time?—I have.

979. For how many years?—Nineteen years.

980. Probably you have had a great deal of experience in connexion with this question?—I have had a great deal of experience with the internal traffic of the country, and I have had experience also as to the Continental traffic.

981. Mr. *Hodgson.*] Your Company obtained an Act of Parliament last year, enabling them to run steamvessels between Harwich and Flushing, Rotterdam, and

and Antwerp, did they not?—Yes; we obtained an Act enabling us to run boats from Harwich to Rotterdam, and from Harwich to Antwerp and Flushing.

982. What capital have you for that purpose?—£120,000.

983. What steamvessels are you building?—Three passenger boats and two boats for goods and cattle traffic.

984. What are you doing in the meantime?—We have chartered steamboats since October, for the purpose of carrying cattle and goods traffic; the passenger traffic we have deferred interfering with until we get our own boats, specially adapted for passenger service.

985. When did you commence running?—On the 1st October 1863.

986. Has the enterprise been successful?—It has been entirely successful so far, and has exceeded our expectations. We had difficulties at the outset in obtaining suitable vessels; the Confederates had swept the market of all eligible boats, and, unfortunately, we could not get the boats we required; but notwithstanding that, the enterprise has answered our expectations.

987. Before getting this power, did you make any application to the General Steam Navigation Company, or to any other company, to make the passage?—Before applying to Parliament we solicited the General Steam Navigation Company to place boats between Harwich and Rotterdam in connection with the railway, but the General Steam Navigation Company declined doing so.

988. Have you made that application more than once?—Since we commenced running steamboats from Harwich to Rotterdam, we applied to them a second time, suggesting that they should land their traffic at Harwich, and that we would carry it by railway, charging the same fares for passengers and rates for goods and cattle as we debited ourselves; taking the cattle direct to the market, and so avoiding the drive through London, as well as incidental charges for wharfage and landing. At the present time, the charge made for landing an ox at St. Katharine's Wharf is 2*s.* 6*d.*, for a calf 6*d.*, for a sheep 1½*d.* per head. We have fixed a rate from Rotterdam direct to London, avoiding these charges altogether, so that the sender of cattle has now merely to pay the price from Rotterdam to the London market, avoiding the London charges for wharfage, landing, &c., altogether.

989. I think you stated that you renewed your application, and that it was refused again?—It was refused a second time. I may mention that in respect of the incidental charges made upon cattle landed in London, for wharfage, landing, and driving, on the quantity of cattle imported from Rotterdam, amount to 10,000*l.* per annum.

990. That is all saved now, is it not?—That charge is saved altogether under the Great Eastern Company's regulations.

991. That is one of the advantages to the public which has resulted from your having those steamboat powers, is it not?—Yes. In addition to that, we have fixed through-rates on goods between London and Rotterdam, avoiding the charges for agency, landing, and wharfage; there the difference is something like 25 per cent. upon the freight, amounting to a very large sum. We have also fixed rates between Birmingham, Wolverhampton, Tipton, and Walsall and Rotterdam; the goods now go direct through Peterborough to Harwich, avoiding the cartage in London, as well as the landing and agency charges. The difference is something like 7*s.* 6*d.* per ton upon the goods traffic coming from the midland districts of England.

992. The public have the advantage of a saving of distance, have they not?—Yes. The distance from London to Rotterdam by our route is 190 miles; the distance by the General Steam Navigation Company's, entirely by water, is 220 miles. The time occupied between London and Rotterdam averages from 19 to 25 hours; we hope to effect the passage in 12 hours from London to Rotterdam.

993. You intend to keep the cattle traffic separate from the passenger traffic, do you not?—Yes; we intend to limit the passenger boats entirely to passenger traffic.

994. Is that the case at present in the service by the General Steam Navigation Company's boats?—At the present time the General Steam Navigation have cattle, goods, and passengers in the same boat.

995. These are some of the advantages which you have given, or that you propose to give by means of the power which you obtained last session?—Yes.

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996. Both in this country and in Holland to which you run, have the public expressed their satisfaction with the powers which have been conferred upon you?—The public in London have expressed the greatest satisfaction at the manner in which we have performed their business, and are perfectly satisfied with the charges we are making. They acknowledge that there is a great saving as between our charges and those made by the General Steam Navigation Company. We have the same evidence in Holland; there the public are perfectly satisfied with our goods business, and look forward to our passenger service with much favour.

997. Have you upon some occasions made preparations and taken pains to execute some special service in the event of the Maas being frozen up?—Yes; during the last winter the Maas was frozen and the navigation stopped for three weeks. We made arrangements with the railway company from Rotterdam to the Hague for the carriage of cattle and goods to Schevinegon, on the Dutch coast, where we hired fishing smacks of 120 to 130 tons, and so carried on the traffic notwithstanding the Maas being frozen. The merchants expressed their satisfaction, and mentioned the fact that during 20 years they never knew of a case where the traffic was carried on between England and Holland whilst the navigation was frozen.

998. It is alleged that, generally speaking, the commercial bodies and the public have looked with dissatisfaction and distrust upon the conferring of these powers upon railway companies. Have you found that to be so in your experience?—No, on the contrary; I concur with what was said by Mr. Forbes with reference to a railway company having the control, not only of the railway service, but also of the boat service.

999. Have you any other remarks to make upon the subject of your own system of transit?—I may say unhesitatingly that in establishing a line of steamers between Harwich and Rotterdam we shall be enabled to carry out the arrangements much more effectually if the steamers are in our own hands than we should through another party.

1000. Mr. *Adair.*] What will be the state of the trade supposing the London, Chatham, and Dover Company obtain power to run steamers to Rotterdam—what will occur?—I think it is very likely that the same arrangements will take place as those between the South Eastern Company and the London, Chatham, and Dover Company. I think the London, Chatham, and Dover Company and the Great Eastern would find it to be to their interest as well as to the interest of the public to charge the same fares, giving the public the opportunity of travelling by either route—so that a ticket issued at Shoreditch to Rotterdam, through Harwich, shall be available for the return journey through Ramsgate to London.

1001. Do you anticipate that the London, Chatham, and Dover Company will run their steamers from Ramsgate to Rotterdam, and that you will contine to run your steamers from Harwich to Rotterdam?—Yes; I think there will be trade sufficient for both routes.

1002. That is not the present result of the arrangement between the South Eastern and the London, Chatham, and Dover Companies; is not that arrangement that the South Eastern Company are not to run steamers from Dover to Calais, and the London, Chatham, and Dover Company are not to run steamers from Folkestone to Boulogne?—Still the French traffic finds its way, whether through Boulogne or Calais, and there is an arrangement for the apportionment of the receipts earned by both routes.

1003. By that arrangement the London, Chatham, and Dover would obtain the command of the whole of the Belgian and Dutch-Rhenish traffic through Calais and Rotterdam, would they not?—No: we shall also be at Antwerp for the Belgian traffic.

1004. You think that both routes will be kept open under all circumstances?—I feel satisfied that they will.

1005. The result, therefore, of the competition for the service as far as the public are concerned, will be the equality of rates, and a competition of accommodation?—An equality of rates, and there will be competition for accommodation no doubt.

1006. How do you anticipate that the further development of your Harwich and Rotterdam service will affect the London and Rotterdam service which is now in operation; if it leads to an active competition, will it lead to the lowering of

of the freights?—I think the present freights for goods and cattle traffic may be said to be the minimum. We are tied down by Act of Parliament to a tariff governing the railway, and we are held down in our steamboat Bill to certain fares for the passage by steamboat.

1007. Are you running at your maximum Parliamentary rates upon land and your minimum Parliamentary rates at sea at the present moment?—By no means.

1008. Do you think that such a change could take place that you could diminish your sea rate, at the same time arranging so as to distribute the loss over the whole railway system?—No; we show the freights between Harwich and Rotterdam distinctly, and we show the freights between London and Harwich so that the public would at all times have a check on any attempt to apply railway tolls to boats or steamboat tolls to lines of railway.

1009. Supposing that an article of trade is going from London to Rotterdam, *viâ* Harwich, the consignor knowing what is due to land carriage, and what is due to sea carriage, what is the difference between the charge upon an article that is going to Rotterdam, charges for land carriage to Harwich, and the charge upon the same article going no further than Harwich; is the price the same?—For the local traffic to Harwich the price to Harwich alone will be higher than to Rotterdam.

1010. In what proportion?—I should think to the extent of 50 per cent. on goods traffic going to Harwich. For Harwich town the rate is 50 per cent. higher than the price charged to Rotterdam, arising pretty much from the same circumstances which have led to the rates from London to Aberdeen, a distance of 560 miles, being less than from London to York, 190 miles, arising from sea competition.

1011. What competition has a man at Harwich with your railway?—Having made our railway to Harwich, not for the accommodation of Harwich locally, but for the purpose of accommodating the continental traffic, we must consider whether we will adopt the rate charged from London to Rotterdam by sea, or whether we will give up the traffic altogether.

1012. Mr. *Clay*.] In what year was it that the application was made to the General Steam Navigation Company, and they refused to put on boats?—It was in 1862.

1013. In what year was the Dutch-Rhenish Railway opened?—I am not aware.

1014. It was some time before that, was it not?—Many years earlier.

1015. Sir *Francis Goldsmid*.] Was that application to the General Steam Navigation Company refused absolutely, or refused because they were not satisfied with the terms which you offered?—It was absolutely refused. They objected altogether; and so late as November 1863 we again drew their attention to the establishment of the Harwich route, and said that if they would put their boats into Harwich, we should be very glad to bring their traffic up to London at the same price as our own.

1016. You had tried it yourselves, and lost money by it some years previously, I think?—In 1855 there were two boats chartered, and they were taken off in consequence of the North of Europe Company's affairs being wound up.

1017 The railway company had tried boats there, had they not?—Not upon our own account.

1018. There were other boats in connection with you, I think?—The North of Europe Company had two boats, and in the year following a private individual put one on, but it did not answer his purpose.

1019. I have a report here—I think it is dated about the year 1856. What boats does that report speak of?—The North of Europe boats.

Veneris, 11° *die Martii*, 1864.

MEMBERS PRESENT:

Mr. Clay.	Mr. Hutt.
Mr. Algernon Egerton.	Mr. Kinnaird.
Sir James Fergusson.	Mr. Lygon.
Sir Francis Goldsmid.	Mr. Massey.
Mr. Richard Hodgson.	Lord Stanley.

THE RIGHT HONOURABLE LORD STANLEY, IN THE CHAIR.

William Conway Morgan, Esq., called in; and further Examined.

W. C. Morgan, Esq.

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Vide Appendix.

1020. Mr. *Hodgson.*] WILL you hand in a list of the rules and regulations under which the general association of the proprietors of steam shipping is constituted and conducted?—I will. (*The same was handed in.*)

1021. What is the amount of tonnage represented by that association?—It is some time since I have made up the precise amount of the tonnage, but when I last did so, it was as nearly as possible 300,000 tons.

James Allport, Esq., called in; and Examined.

J. Allport, Esq.

1022. *Chairman.*] WHAT situation do you hold at present?—That of General Manager to the Midland Railway Company.

1023. Has the line with which you are connected at any time sought to obtain powers over sea transport?—We have not sought to obtain powers, although we run to one or two ports.

1024. With which ports are you connected?—Beginning at the north, we are connected with Morecambe Bay; we are of course connected with London, and also with Gloucester and Bristol.

1025. May I take it that your company has no direct interest in this question?—We have an interest to this extent, that we have had very great difficulties in inducing, in fact we have failed in inducing, parties to put on steamers at Morecambe, which is our principal port for Ireland, and we have been obliged, having no powers to make arrangements with two or three individuals, by which steamers are now run between Morecambe and Belfast daily.

1026. Your object was to develope, or, I may perhaps say, to create a traffic between Morecambe and Belfast?—Quite so; the port of Morecambe is the nearest port of shipment for Ireland from the manufacturing district of the West Riding of Yorkshire, from Leeds, Bradford, Keighley, Bingley, and the whole of that district; the Midland is the very best through line by Morecambe to Ireland.

1027. It may be the nearest in point of distance, but are there not advantages in such a port as Liverpool which Morecambe cannot possess?—I am not aware of any excepting that Liverpool has its wet docks; Morecambe has tidal docks, and the steamers rarely go into the wet docks in Liverpool; the convenience for shipping at Morecambe is very great; the steamers run alongside a quay, and the goods are taken direct from the railway trucks and put on board, and *vice versâ*; I do not know that Liverpool possesses even the same advantages; I do not think that in any instances can the goods be taken direct from the trucks and put on board the steamers in Liverpool.

1028. Are

1028. Are you able to tell the Committee what inconveniences you have met with in endeavouring to establish or to create a trade of this kind without having any steamboats in your own power?—I should mention that before my connexion with the Midland Company some years ago I had the management of the Manchester, Sheffield, and Lincolnshire Railway when the Grimsby Docks were opened, and there, although the company spent rather more than a million sterling in constructing one of the finest docks in England, we failed altogether in inducing the steamboat proprietors of Hull or elsewhere to put on steamers, and there we were obliged to purchase steamers, which subsequently fell into the hands of a company consisting mainly of directors and shareholders of the railway company to run steamers from Grimsby to Hamburg; I have left that railway company now for some 14 years, but that was my experience at Grimsby; at Morecambe up to the present day we have failed in inducing steamboat proprietors to put on steamers from Morecambe to Belfast, although the dock has been opened now for about 14 or 15 years, and the boats are practically the company's boats; we are responsible for them.

1029. What boats are those?—The three boats from Morecambe. We have daily sailings between Morecambe and Belfast, and we are responsible for the working of the boats and the loss there may be upon them, but it is very desirable that it should be put upon a better footing. I think it is very undesirable that a railway company should exceed its powers if it can be avoided.

1030. Do I rightly understand you to say that without having Parliamentary powers to own steamboats, your company nevertheless does so?—Not as a company; the steamers are owned by a few individuals, but the company guarantee them from all loss; practically, it is another way of saying that the company are the owners.

1031. In what form is that done; is it a traffic arrangement?—Yes.

1032. Do you give a guarantee to the steamboat company that their returns shall not fall below a certain minimum?—Not precisely so; we give them through rates and fares from all our stations, giving them such a proportion from time to time as will enable them to realize a certain sum. But if that had not been done, although the expenditure at Morecambe is very large, I believe at the present moment we should not have had a single steamer upon the station.

1033. Has your company been legally advised that such an arrangement as you speak of is within your powers?—Yes, it is within our power to make traffic arrangements with steamboat companies in precisely the same way as we make traffic arrangements with railway companies for booking and invoicing passengers and goods through from point to point; it is the same as booking a passenger from London to Aberdeen.

1034. Do I rightly understand you that the way in which you do it is this, that you guarantee to the steamboat company a certain amount of traffic, upon condition of their giving you certain rates?—No, we do not even do that; we divide the receipts; take for example the receipts from London to Belfast; assume the distance from Morecambe to Belfast to be 120 miles; then if the mileage proportion of the whole receipts is not sufficient to pay the boats, we give them payment as upon 140, 150, or 160 miles, as the case may be, so that they get a certain share of the traffic.

1035. Mr. *Hodgson.*] There are more ways than one to secure the necessary end, are there not, if you have not statutory power?—Yes, I believe it is within the power of two railway companies, or a railway company and a steamboat company, to do this; assuming that the railway distance is 100 miles, and the sea distance should be 20 miles, it would be in the power of the two companies to make the railway 10 miles and the sea 100 miles in their calculations.

1036. Do you believe that under any circumstances, if a railway company finds it necessary that a steam passage should be created, they will have any difficulty legally and within their Parliamentary power, without having powers themselves to hold steamboats, to establish that steam passage?—I have no doubt they can establish it by round-about means; in fact, all companies have been driven to do that; all at least which have established new ports or new docks.

1037. You have been for a long time connected with railway management, have

have you not?—I think I have been a railway manager now for about 22 or 23 years.

1038. Does your experience teach you that it would be preferable upon all accounts, that if these powers are to be exercised there should be statutory powers conferred upon railway companies to exercise them?—I think it is most desirable that these powers should be conferred upon railway companies; I would not allow railway companies to establish steamers at ports or harbours which are not upon their own system, but I think that where a railway runs to the sea, they should have power to establish steamboat communication from that port to which they run.

1039. When you were manager of the Manchester, Sheffield, and Lincolnshire Railway Company, did you endeavour in the first instance to secure the co-operation of steamboat companies, in running steamboats from your port of Grimsby?—I did.

1040. Will you explain the nature of the difficulties that prevented your accomplishing that object?—The difficulties at a new port, for very many years, of getting merchants or shipowners, and I may say in fact any population, to establish themselves there. The Hull steamboat owners said our warehouses, our business, and our offices are here; why should we go to Grimsby; it is only 20 miles further to come up the river; why should we have the trouble of establishing a business at a new place, when we have it here. I believe that these are practically the difficulties in the minds of steamboat owners. I do not think they will ever remove from an old port to a new one, until they see the company owning the new port establishing steamers for themselves.

1041. You think then that the Hull steamboat owners will not remove to Grimsby to create a trade, that they will not move until that trade is shown by other people to exist?—Yes; quite so.

1042. The same thing happened as between Hull and Hartlepool, and the same considerations influenced the steamboat owners in that case, did they not?—Yes; the old dock at Hartlepool was in existence for nearly 20 years before a single steamer sailed from Hartlepool.

1043. Was not it the establishment of steamboats, under the influence of the railway company, which gave impetus to Hartlepool?—Yes.

1044. Now the tonnage at that port is enormous, is it not?—Very large; we are sending goods from all parts of the Midland system to Hartlepool; it offers facilities which Hull does not offer, and although Hull is much nearer the manufacturing districts on the Midland line, Hartlepool has advantages in respect of coals, and so on, that give it a decided preference over Hull.

1045. Does the same cause operate, or did the same cause operate in respect of the trade from Morecambe, as compared with that from Liverpool?—The same cause precisely.

1046. There was the established trade from Liverpool, and Morecambe was a new trade?—Yes, and Fleetwood was in the same position; until the companies really took it in hand themselves they could not get a line of steamers established from Fleetwood.

1047. Then you would not admit this proposition, that where trade was likely to follow the construction of a dock and port, steamboat proprietors would necessarily bring their ships to that port?—Certainly not; my experience is decidedly against it.

1048. You have daily and constant communication with the manager and directors of other railway companies situated like your own, have you not?—Yes.

1049. Can you speak on their part, and state that their opinions would coincide with yours upon this matter?—I do not think I have ever heard a contrary opinion on the part of railway directors or officials who are interested in the question; steamboats have been run by the London and North Western, the Great Western, the South Western, the South Eastern, the London, Chatham, and Dover, the Hartlepool, the Midland, the Eastern Counties, the Lancashire and Yorkshire, and, in fact, all the companies who have access to ports.

1050. Sometimes with powers and sometimes without them?—Sometimes with them and sometimes without them.

1051. Has the Midland Railway Company itself at any time applied for powers to establish steamboats?—No, it has not. The Midland Company has only

only within the last three years become the lessees in perpetuity of what is called the Little North Western Railway, which runs to Morecambe; before that we merely worked it under a short agreement, and we had no motive for seeking powers for putting on steamers; but within the last three or four years we have leased that line for 999 years, and now we have a direct interest, but we have not applied for powers; we saw that during the last two or three Sessions powers had been granted to other railway companies, and my directors felt convinced that sooner or later general powers would be given to railway companies, subject of course to conditions.

1052. Although your company has not applied for these powers itself, your attention has been drawn, I believe, to the applications of other companies, with a view to ascertain the feelings of Parliament upon the subject?—Yes.

1053. In that process have you had an opportunity of judging of the public feeling apart from the feeling of mere steamboat proprietors?—Yes.

1054. Can you state whether the public generally, that is to say, the commercial public object, or the contrary, to railway companies getting these powers?—I never heard an objection from anyone of the public, unless he was interested in steamers. I have heard steamboat proprietors say a great deal against it, but I believe if you were to call upon the various chambers of commerce, or the various commercial firms in our large manufacturing towns, they would almost to a man be in favour of the railway companies having these powers; it must be self-evident that they give great convenience. Take Leeds and Belfast for example—there is a very large traffic in flax between those two places—if the railway companies had not some control over the steamers they would not think of sending the goods through at a through-rate, because doing so involves them in the sea risk; the result would be that everything would be charged to the port of shipment, and then a fresh charge would be made from the port of shipment to the ultimate destination of the goods; but the steamers being in the hands of the railway company, they are willing to take that responsibility and that risk, because they know they have a control over the steamers. I am quite certain that the commercial interest, apart from the steamboat interest, would be entirely in favour of railway companies having these powers.

1055. Do you think that the public would gain in the reduction of rates?—I have no doubt of it; they would gain more still in this way; if the companies did not charge those goods through, it would involve the necessity of brokers or agents at the port of shipment.

1056. Do you think that the service, as a general rule, would be performed more expeditiously and punctually for the benefit of the public?—I have no doubt they would save, in almost every instance, at least a day.

1057. *Chairman.*] I suppose you do not deny that a railway company can compete successfully with a steamboat company on account of its larger capital?—Certainly it can, if the railway company felt disposed to run a line of steamers at a loss it could do so no doubt, but railway companies are as fond of making profits as steamboat proprietors.

1058. Do you think then that it would never be worth their while to run steamers at a loss for any length of time for the purpose of ultimately securing the traffic?—I think not; I do not think that would be persisted with for any length of time.

1059. Sir *James Fergusson.*] Would they not temporarily submit to a loss on the steamers, *per se*, though not a loss over their whole system?—I think you will find that the railway rates are so moderate everywhere that the reduction upon a railway cannot go beyond a very limited extent.

1060. Mr. *Hodgson.*] Would it not be competent for Parliament when applications are made by railway companies to get these powers so to arrange the maximum railway rates, and the minimum sea rates as to prevent any such undue competition?—No doubt it would be competent for Parliament to do that, but I question the policy of putting on such a restriction. I do not think that railway companies from choice would put on steamers; I will take the Midland as an example; I believe that if a steamboat company or any steamboat proprietors would come and give us a *bonâ fide* guarantee that they would run these steamers from Morecambe to Belfast, as we do at present, we should be perfectly ready to hand over the trade to them. Railway companies certainly do not from choice take up steamboat concerns.

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1061. *Chairman.*] Supposing that it were well understood that a powerful railway company was determined to maintain a practical monopoly of the sea traffic from one point to another, would it be necessary for them to make any considerable sacrifice after the first few years for that object. Would not the fact of that determination being known, and of its being known that they could afford if necessary to make a sacrifice, make it unnecessary for them in effect to make that sacrifice?—Of course railway companies could do that, no doubt, but it is a proposition that I cannot conceive would ever be carried out into practice.

1062. Do you contend that they would not do so, or that it would not be disadvantageous for the public that they should do so?—I do not think it would be disadvantageous for the public for them to do so, because I think that under the general law a railway company would be bound to give a steamboat proprietor the same through rates, and the same amount and proportion of the traffic as they give their own boats. I feel quite persuaded of that; what is commonly called the Cardwell Act would compel companies to do that.

1063. Do you think that that Act can always be effectually enforced?—Not always; it can in that particular case be enforced. Railway companies, the Midland Company, for instance, between any two points, could not charge one person higher than another. I think the Act is effectual to prevent an abuse of that kind. It would be so in the case of steamboats.

1064. Practically, whatever Act of Parliament may be passed to prevent it, has not a railway company very great power of favouring one class of traffic and one class of proprietors at the expense of another?—No doubt they have great power, but I am not aware of a single instance in which those powers have ever been abused in respect of steamboat companies. I do not remember an instance of it. Railway companies amongst themselves have fights, which may sometimes appear, and indeed are, very absurd; but I think as between railway companies and steamboat owners the case is altogether different.

1065. It used to be contended that railway companies had an unfair advantage over steamboat companies, because they alone enjoyed the advantage of limited liability; that is now of course at an end?—Yes; that is now at an end.

1066. In any case where a railway company has obtained power over sea-going steamers, is there any provision for the fares by sea, being limited to a certain amount?—I cannot answer that question; I have not examined into it.

1067. Are you aware of any such provision?—I am not.

1068. Therefore, although on land, where they possess in many cases what may be called a Parliamentary monopoly, and are restricted to a certain amount of charge, yet in the sea passages where by means of that land monopoly they may obtain powers also, no such Parliamentary restriction as to profits exist?—I think not.

1069. Mr. *Massey.*] I think I understood you to say that the Manchester, Sheffield, and Lincolnshire Railway Company had constructed a dock at Morecambe?—They have at Grimsby.

1070. Are their rates at Grimsby and the dock dues so adjusted as to afford reasonable encouragement to independent steamboat companies to resort there?—I do not know what the rates in force now are, but when we opened the dock, and some time after we opened it, for the purpose of inducing steamboat proprietors to come there, we reduced the dock dues to a mere nominal charge; we intended making it a free dock, but we were advised by counsel that if it was once made a free dock we could not resume the power of charging, and we made the charges so small, I think one halfpenny per ton, or something of that sort; so that practically it was a free dock. I believe it has continued to be so to the present day; there may be some modifications, but I think not to any great extent.

1071. Do you know what dues are charged by the Hull Dock Company?—I do not; they were always considered very high. The Hull Dock Company were before Parliament some few years ago, and I believe their dues were then revised and re-modelled.

1072. Are they adjusted upon such a scale as to pay, and to make the Hull Dock Company a beneficial concern?—I think so; I think the Hull Dock Company has always paid very good dividends. I have not paid much attention to their affairs lately.

1073. You

1073. You say, do you not, that you are desirous of running steamers from Morecambe to Belfast, in connexion with your line?—Yes.

1074. Did you make any proposal to any of the steamboat companies to undertake that service?—Originally we did to several of the Liverpool and Glasgow proprietors.

1075. Did you find a refusal or no encouragement?—In every instance we had a refusal; there was not a single steamer put on.

1076. The company have now established a line of steamers of their own, have they not?—Yes.

1077. Is that passage much used?—Yes, very much; I think last year—I have not the number of passengers with me—but we brought upwards of 20,000 head of cattle from Belfast to Morecambe.

1078. Is there any competition upon that line now upon the part of steamboat proprietors?—Not from Morecambe but from Fleetwood; there the Lancashire and Yorkshire and the London and North Western Companies have made arrangements with the steamboat proprietors much of the same nature as we have; Fleetwood and Morecambe are the two competing ports to Belfast.

1079. What is the nature of that competition; is it a competition between the two railway companies?—It is a competition through from various places to Belfast; from Leeds, from Bradford, from London, from Sheffield, and from various other places.

1080. Do any independent steamboat companies enter into that competition?—I think not; I think the Fleetwood steamboats, although they are in the names of Messrs. Henderson & Co. of Belfast, are subsidized by the railway companies, or at any rate under their control.

1081. Sir *James Fergusson.*] I suppose any independent steamboat company would hardly come in competition with the present steamers on an equal footing?—As far as the Midland Railway Company is concerned, I should be very happy indeed to give them every opportunity; if any steamboat companies will bring their steamers to Morecambe they shall be put precisely upon the same footing as our steamers; and further, if they will only give us a guarantee that they will continue them, they may take them off our hands.

1082. Mr. *Kinnaird.*] You stated that there was a great trade between Lille and Belfast, did you not?—Leeds, I said, and also from Hull; there is a very large amount of foreign flax imported into Hull, and sent from Hull both to Fleetwood and Morecambe for Belfast.

1083. Is that a growing trade?—It is a largely increasing trade.

1084. Before the railway came to Morecambe, was there any regular communication by sea between Belfast and Morecambe?—Not the slightest.

1085. You think that your railway company created, I may say, the traffic?—Yes, they did, undoubtedly.

1086. Are the fares for goods between Leeds and Belfast very much reduced, as compared with what they were formerly, for the carriage; do you remember the highest price which was charged formerly?—I do not, but they have been very much reduced; in fact I think we are booking through from Hull to Belfast at a less rate now than existed even in the last 12 years from Leeds to Belfast.

1087. It is a trade that has paid upon the whole?—It has.

1088. You say that you compete practically with Fleetwood; have the railway company at Fleetwood the power to run steamers?—I think not.

1089. They do it, however?—They do it.

1090. Very much in the same way as your company have attempted to do it?—Yes. I do not know that their plan is identical with ours.

1091. Practically, in your own case, the Act of Parliament is evaded. I suppose many of your own directors find the capital and carry the steamboat concern on under the guarantee of the railway company?—That is so.

1092. It comes to the same thing, does it not?—It comes to precisely the same thing as if the company had steamers in their own name.

1093. If you can practically do it, why do railway companies come to Parliament and press for powers to do it?—It is rather a responsible thing for even directors to take upon themselves, and they would rather be relieved of it. I think where it is so evident that powers should be given, it is very undesirable that these roundabout ways should be adopted to accomplish so desirable an end

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as that of putting the termini of the various railways in connection with steamboats upon the sea.

1094. If the Legislature were to continue its present policy, you think that, practically, the railway companies would find means of evading it?—Yes, they would. I do not think you could frame an Act of Parliament that would have the effect of preventing railway companies from putting on steamers as they do now.

1095. The Mayor of Hull has stated in evidence that steam power is practically unemployed at times. Did your railway company endeavour to make any terms with the steamboat proprietors to supply the steamers between Morecombe and Belfast?—We have, but we have always failed. I may tell you that in the case of the Manchester and Sheffield Company, at Grimsby, we utterly failed. I had the negotiation in my own hands for some years, but I did not succeed.

1096. Grimsby has very much failed in what it was expected to do at present has it not?—I believe it has been entirely in consequence of the difficulty of getting steamers there. There can be no question that the distance from Manchester to Grimsby is pretty much the same as from Hull. There is very little difference by railway, but the facilities at Grimsby are much greater than they are at Hull, and it is 20 or 22 miles nearer the sea, with a very good roadstead, very admirable docks; and every appliance that modern engineering could devise has been given to Grimsby. They have hydraulic cranes, and everything that could be done has been done.

1097. You think that it is owing to the absence of the power of putting on steamers by the railway company, that the dock has not developed itself?—I think it is.

1098. Mr. *Hodgson.*] Are there Liverpool steamers to Belfast?—Yes.

1099. And from Morecambe?—Yes, and from Morecambe.

1100. And Fleetwood?—Yes, and Fleetwood.

1101. Are there any from Maryport or Whitehaven?—There is one from Silloth, and I think one from Maryport; I think they have occasionally taken it off, and put it on again; I think there is one now.

1102. And from Silloth?—Yes; and from Silloth.

1103. Are there any steamers running from Port Patrick or Stranraer?—I am not quite sure whether that steamer has not been taken off.

1104. But there has been one?—Yes; within 12 months.

1105. Is there one from Glasgow?—Yes; from Glasgow.

1106. And from Greenock?—And from Greenock.

1107. So that there is plenty of competition between port and port?—No port has better steamboat competition than Belfast has.

1108. The effect of the railway companies having steamboats from Morecambe has not been to drive off private shipowners from other ports, has it?—Certainly not.

1109. Mr. *Hutt.*] It has been represented to the Committee that the necessary consequence of allowing railway companies to be the owners of steamboats would be this, that they would in the first instance so reduce their fares as to drive private enterprise out of the trade; and having done so, and thereby effected a monopoly, the public would be exposed to the evils of high and extortionate fares; is that your view of the case?—Certainly not; I think it is a very idle fear upon the part of the steamboat proprietors. Railway companies act generally from interested motives, like all other commercial bodies, and all they want really is the carriage of the goods over their railway.

1110. Are not the railway companies deeply interested in giving to the public, accommodation in travelling along their line?—Certainly, they are deeply interested in it.

1111. Would it be in accordance with their interest to levy high charges, or to give inferior accommodation to those passengers who must proceed by the packets?—Undoubtedly not; especially with the competition which there is now at the various places. I do not know a single place at which any one company can be fairly said to have a monopoly of the traffic, either by railway or by sea. It is true that at Holyhead there is only one company, the London and North Western Company; but if they attempted to make very high charges, the traffic, particularly the goods traffic, would flow directly either to Liverpool on the one hand, or to Milford on the other, or to Bristol; so that it would be quite impossible

sible for the London and North Western Company to maintain very high charges; and I think that will apply to almost every port in the kingdom.

1112. Did I rightly understand you as saying that if the railway companies could secure the regularity and despatch of the sea packets, which is necessary for the well-working of their line, they would be very glad to have nothing at all to do with the steam packets?—I think so; certainly I can speak most confidently on behalf of the Midland Company.

1113. You conceive that it is more to the interest of the public than of the railway companies, that these steamboats should be in the hands of the railway companies?—I think so.

1114. An objection has been made to grant these powers to the railway companies, on the ground that it would practically establish a monopoly; is not a monopoly practically given to the railway companies as carriers by land?—It is.

1115. And has not the Legislature found it easy to frame regulations such as will relieve the public from the evils of monopoly?—I think so most undoubtedly, and apart from the Legislature framing regulations, I believe that the companies themselves cannot now establish a monopoly, in the sense of the term in which it is understood by the public. I take the case of the Midland Company as an example. Although there are many towns upon that railway where we may be said to have a monopoly of the traffic, in no instance do we ever exercise that monopoly. I do not think we have an instance upon the Midland Railway where we charge our full Parliamentary tolls. It is quite impossible that a railway company or a combination of railway companies can establish the monopoly of railway travelling, which is understood by the word "monopoly" by the public.

1116. It has been with a view to protect the public from the abuses which monopoly entails, that Parliament has felt it necessary to restrain the railway companies by certain regulations, has it not?—No doubt.

1117. Could not those regulations, or similar regulations, be applied to railway companies if they were permitted to have steamboats?—No doubt.

1118. Is not a railway more of the nature of a strict monopoly than a passage by sea?—Undoubtedly there can be no monopoly by sea; it is evident that that is impossible.

1119. Mr. *Clay*.] You have heard, I presume, in the course of your experience, of such cases as hostile arrangements between railway companies, by which a train has arrived at a junction five minutes after the train of the hostile company had been fixed to start, and a variety of circumstances of that kind?—I have heard of very few such cases indeed; I believe that there is a great mistake about that; any one who is practically acquainted with the working of railways knows what a great difficulty there is in fitting in the trains; I do not believe that any of the larger companies attempt such an obstruction; I do not know an instance; take our own Midland case again; we have between 70 and 80 junctions with other companies; we have trains running from Carlisle to London, upon the one hand, and Bristol upon the other; we find it absolutely impossible to fit in those trains with other companies at all our various junctions; the public find that a train is leaving some junction five minutes before another arrives, or perhaps a quarter of an hour before, and they come to the conclusion, most unfairly and incorrectly, that it is done for the express purpose of inconveniencing the public; I do not think that such an obstructive system prevails.

1120. As a general rule, of course your own interests are best consulted by affording the greatest convenience to the public?—No doubt.

1121. But are you not aware that there have been, perhaps it would be too much to say very many instances, but some instances, and not exceedingly unfrequent where the hostility between two companies has been shown in some such way as I have described, to the great inconvenience of the public?—No doubt railway companies have had contests; but those contests have been generally of short duration.

1122. That has happened, has it not?—It is in the power of two railway companies to do it.

1123. And it has been done?—I cannot say so of my own personal knowledge. Although I have been a railway manager for many years, I can safely say I have never done such a thing in the whole course of my management.

1124. But you have heard of it, at any rate?—I have heard of it.

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1125. You speak of Parliament as being perfectly able to lay down arrangements which shall prevent any of the inconveniences which are expected to arise from conferring these powers upon railway companies. At any rate, Parliament has found no means of stopping such inconveniences as I have pointed out, when it has occurred to railway companies to indulge themselves in these acts of hostility to one another?—If the system had prevailed to any extent, the outcry on the part of the public would have been sufficient to induce Parliament to apply a remedy.

1126. Are there any steamers owned by private owners that sail from Grimsby?—I do not know now. I am not at all connected with Grimsby at the present time.

1127. You spoke of there having been no steamers there. Are there now steamers owned by the Hull owners, and others that sail out from Grimsby?—It is not at all improbable.

1128. Taking that to be the case, is not it probable that the requirements of the trade there, are sufficiently supplied instead of being insufficiently supplied, as you described them to be?—I speak of my own knowledge when I say that during four years we could get no sufficient steamboat accommodation from Grimsby. I had the management of that dock and railway there for about four years after the dock opened, and that was my experience; and it is certainly my experience also at Morecambe at the present time.

1129. You do not know what the state of the case at the present time is?—Not at Grimsby.

1130. Have you never heard that there were other disadvantages in Grimsby in respect of the port not being a safe port, there being dangers at the port of Grimsby from its exposure, which do not exist higher up the river?—Certainly not. On the contrary, I believe that there is not a safer port in the Humber than Grimsby. The outer tidal dock is a very safe place.

1131. With regard to the dock charges which you spoke of, which you spoke of as being high at Hull, are you aware that by the Act of 1862 Parliament has so arranged the dues as to be calculated to pay 5 per cent. upon the existing traffic, with a condition that when they reached 7 per cent. a reduction should be made, so that the public should have the advantage of any increased profits?—I stated that I knew that their tolls had been revised, but to what extent I did not know.

1132. You do not consider such a return upon capital so invested as being at all an extraordinary one?—Certainly not.

1133. You spoke with a good deal of confidence as to the opinion of the Chambers of Commerce upon this subject; are you aware whether any of the Chambers of Commerce have expressed by resolution at their meetings, or otherwise, the wish that railway companies should have these powers?—I cannot speak to that; I know a great many members of Chambers of Commerce in various places, and certainly those members have always, in alluding to the subject, expressed themselves to me strongly in favour of railway companies having it, unless they have been persons connected with steamboat companies.

1134. You are not aware that any Chamber of Commerce has come to any formal resolution in favour of granting this power to railway companies?—I do not know.

1135. Are you aware that any Chamber of Commerce has come to the contrary resolution, antagonistic to the granting of these powers to railway companies?—I believe the Hull Chamber of Commerce did so.

1136. Are you aware whether the Associated Chamber of Commerce, at their meeting held not long since, in London, entertained the question?—I believe they did; I believe there were two Chambers of Commerce opposed to it, and only two, so I am informed; but I do not speak of my own knowledge.

1137. Sir *Francis Goldsmid.*] You have mentioned making applications to persons interested in steamboats to undertake the establishment of steamboats from Morecambe to Belfast, before you established them yourselves; were such applications made to more than one steamboat company?—Our agent at Morecambe was authorised to apply to most of them, and I believe he did. I did not do it myself, but applications were made to most of the steamboat companies both in Liverpool and Glasgow, but we failed in getting them to undertake it. I should mention that we have now one steamer in the hands of private individuals, which we formerly ran ourselves, from Morecambe to Londonderry; a private firm

firm wished to take up that vessel and we allowed them to do so, and now it is in their own hands, and we should be only too glad if they would come and take up the Belfast Line. *J. Allport*, Esq. 11 March 1864.

1138. You mentioned before, I think, that you would be willing to make over your steamboats, or that those interested in them would do so, to any private firm or company; is that because they do not, as an undertaking by themselves, prove extremely remunerative?—I do not think in the company's hands they would be. The Midland Railway is of that magnitude that I have no doubt the steamboats would be more economically managed in the hands of private persons than they would be in the hands of the railway company.

1139. As at present managed, as an undertaking by themselves, they are not satisfactorily remunerative?—I do not think they are.

1140. *Chairman.*] You are now speaking of a particular case, not of the general rule?—I am speaking only of that particular case, namely, Morecambe.

1141. Sir *James Fergusson.*] In speaking of the attempts that you made to induce steamboat owners to run vessels from Morecambe to accommodate your traffic; the traffic you referred to was a new traffic to be created, not an existing traffic from that port?—It was an existing traffic; for instance, take the various towns from which the Midland Railway runs: Birmingham, Nottingham, Leicester, Derby, Sheffield, Leeds, and Bradford; of course, the traffic from those towns was in existence, but it was going altogether by another route, and it was a new traffic for that route.

1142. Mr. *Kinnaird.*] With respect to Grimsby, was the experiment tried of running steamers from Grimsby to the North of Europe in intimate connexion with the railway company?—Yes, it was.

1143. It failed, did not it?—Yes.

1144. Owing to what causes do you suppose?—I believe it was owing to bad management.

1145. It is a fact, is it not, that it failed?—Yes, it failed; I was a shareholder, I am sorry to say.

1146. Mr. *Hutt.*] That is rather a long and complicated story, is it not?—Yes, a very complicated story; I have no hesitation in saying it was entirely from bad management.

Cornelius Willes Eborall, Esq., called in; and Examined.

1147. *Chairman.*] YOU are the Traffic Manager of the South Eastern Railway Company, are you not?—I am General Manager of the South Eastern Railway Company. *C. W. Eborall*, Esq.

1148. Does the company with which you are connected run any vessels of its own?—The South Eastern Company obtained power from Parliament to run their own boats in the year 1853, for a term of 14 years, between the ports of Folkeston or Dover, and Calais or Boulogne. In 1861, we applied for an extension of those powers, and we also applied for powers to run to Ostend. Those powers were granted, and there was no limitation as to the time, whether to Ostend, Calais, or Boulogne. In both cases, we were tied down as to fares, the fares between Folkestone or Dover and Boulogne or Calais being for first-class passengers 8 *s.*, and for second class passengers 6 *s.*; and there was a provision in the Act to this effect, that "such steam-vessel rates shall be at all times charged to all persons equally, and after the same rate in respect of passengers conveyed in a like vessel passing between any of the ports aforesaid under the like circumstances, and no reduction or advance in any such rate shall be made in favour of or against any person using the steam vessels, in consequence of such person having travelled over the whole or any part of the railway, or not having travelled upon any part thereof." My opinion is, that these powers have conferred great public benefit, and that if the railway company had not had the entire control, the service would not have been carried on in the satisfactory manner in which it has been. Without the powers I think there would have been greater delays, and there would, at times, have been difficulties in carrying out the service in connexion with the trains on either side, and there would also have been difficulties with reference to special fares which are made during the summer time for excursionists. During the last year, the number of passengers carried by way of Folkestone and Boulogne amounted to somewhere about 100,000, and by way of

Calais 106,000. By the Belgian services, which are now entirely in the hands of the Belgian Government, 15,000.

1149. Mr. *Hutt.*] That is with Ostend, is it not?—With Ostend.

1150. *Chairman.*] What are your present Parliamentary powers with regard to the possession of sea-going vessels; you may trade to Ostend, may you not?—We may trade to Ostend.

1151. Your power extends also to Folkestone and Boulogne, does it not?—To Ostend, Calais, or Boulogne, from Folkestone or Dover.

1152. Is that for an unlimited time?—For an unlimited time.

1153. By the Bill of 1853, it was limited to 14 years, I think, but it has been subsequently extended?—Exactly, it has been extended to Ostend, and the time unlimited. The London, Chatham, and Dover Company, in 1860, obtained power to run from Dover to any port upon the Continent of Europe, and there is a provision in their Act, that if the public interests are found to be injuriously affected, the Board of Trade shall have the power of cessor every seventh year, by giving 12 months' notice.

1154. From your experience, should you say that there are greater facilities and conveniences for passengers, than would exist if the sea traffic were in independent hands?—I think so, undoubtedly, especially for this Channel service.

1155. The advantage being, I suppose, the power of through booking, the unity of management, and the absence of petty charges?—Yes, the through booking, the unity of management, and the absence of petty charges at the ports. For instance, we now book through to about 120 places upon the Continent, including St. Petersburgh and Constantinople. A passenger may take his baggage, and have it registered through, and have no trouble with it at all, until he gets to his destination, and the charge for that is included in one charge from London to his destination, for his passenger fare and for his baggage; it has been stated, I think, that we charge in every case, our maximum, by our boat services, that is not correct, for we issue return tickets at a reduced fare; a fare and a half; and for the single ticket, it has been stated, I believe, that we make a charge of 1 *s.* beyond the charge prescribed in the Act, but that is in the through tickets, to enable the passengers to get down to the boats; for instance, at Dover we have been at great expense in making a railway communication with the Admiralty Pier, and in having the passengers' luggage transhipped from the rail to the boat, and *vice versâ*. Besides that, in 1857 the Company did away with the charge for the steward's fee, which was an additional charge over and above the charge prescribed in the Act, and that was compounded by putting on an additional charge for the through ticket, and doing away with the annoyance of the payment of the steward's fee on board the boats.

1156. Do you think that these advantages, namely, the absence of small charges and the through booking, could be equally obtained with an independent company; what is there to prevent a steamboat company from making arrangements with you to do all these things, if you did not run steamers yourselves?—It is possible to do that, but this Channel service is a very special service; for instance, at times when there is a want of continuity of train service, we have to run boats that are not remunerative, on purpose to keep up the service between port and port; I think that would not continue if steamboat companies were providing those boats.

1157. Does not that occur to a steamboat company also; is not it necessary that steamboat companies which have advertised a line of steamers from one port to another, should run them whether they gain or lose by a particular trip, in order to keep up the confidence of the public in the service?—In this case, I do not think the steamboat companies would find it worth their while to do it; a railway company have another interest besides the boat service, they have an interest upon the railway, and it is worth their while to go to an extra expense where it would not be worth the while of an independent company, deriving profit, as it would do, from the steamboats only.

1158. You have through booking arrangements, as I understand, with various inland places upon the Continent?—From London to 120 places on the Continent.

1159. Therefore, you look upon the passage of the Channel as merely a link, or, I should rather say, a gap, in your communication which extends to the interior of Europe?—Precisely.

1160. In short you consider it as a ferry upon a great scale?—That is so; there is no doubt about it. If there were an intermediate party to consult in every case where we wanted to have special boats in connection with special trains, or to make arrangement with reference to rates or fares for particular objects, we should have to consult that party, and we might find some difficulty in carrying out our arrangements. As it is, we have only ourselves to consult. Therefore there is no difficulty, and the arrangements are made at once.

1161. With regard to one of the objections which has been raised to your possession of this power—namely, on the ground of monopoly—is there any check upon you in that respect, and, if so, what?—There is a great check. We have a very strong competition by way of Dieppe. We have also the competition of the General Steam Company direct from London to those various ports. That is a very strong competition indeed.

1162. For a certain class of passengers I presume you may put on one side the question of competition from London by sea direct, because there are many passengers to whom the shortest sea-passage is an object, are there not?—That is so. Still there is the Dieppe route.

1163. Mr. *Kinnaird.*] That is rather a long route compared with the Folkestone and Dover routes, is it not?—Yes.

1164. Are the boats upon the Dieppe line in connexion with the Brighton Company?—Yes; the Brighton Company run by Dieppe in connexion with the Western of France Railway.

1165. Have they Parliamentary powers?—I think they have now; I think they obtained powers last year.

1166. Do you consider the line between Newhaven and Dieppe to be in direct opposition to yours; are the fares lower?—They are very much lower; they are 40 per cent. lower.

1167. They are so fixed on purpose to take the traffic?—They have a service running in about 12 hours between London and Paris every day.

1168. Have the South-Eastern Company ever had a steam packet company in connexion with their line running from Dover to Calais?—Yes; there was Mr. Churchward, who was a contractor for the mail services; he ran boats during his contract between Dover and Calais.

1169. Were they his own boats?—Under his own contract.

1170. But independently of your company?—Independently of our company.

1171. And practically running in opposition to you?—Running in opposition to the Folkestone and Boulogne line.

1172. Sir *James Fergusson.*] The South Eastern Company booked by his boats, did they not?—We booked by his boats.

1173. Mr. *Kinnaird.*] It was not absolutely a competition, then?—Every passenger taken by that route was taken from the Folkestone and Boulogne route; the fares which Mr. Churchward charged were the same as those which we charged.

1174. He never attempted to lower the fares?—Never.

1175. You had steamboat power almost from the beginning, had you not?—There was a steamboat company, composed of some of the proprietors of the South Eastern Railway, running boats for about five or six years up to 1853, at which time we got our powers; as it was found inconvenient, having the independent company. We found we could not carry on the service in the way in which we could do, if we had the entire control. That was the reason for applying to Parliament to sanction the transfer of this company to the South Eastern Railway Company.

1176. You heard the last Witness explain how the Midland Company evaded the Act; you have not attempted the same mode of carrying out the same object, have you?—No; but I believe other companies do evade it in that way, and nothing can be easier than to do so.

1177. You think, then, that if difficulties were thrown in the way of such a system by Parliament, it would nevertheless be continued practically?—Yes; but I think it is a very unwise thing to put companies in the position of having to resort to such means of evading an Act of Parliament.

1178. Since you have adopted this system of through booking to 120 places upon the Continent, have you found the traffic increase very much?—Yes; of course

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course there is a great desire on the part of the public to take through tickets and have their baggage registered to the destination, and get rid of all trouble.

1179. You can take it to St. Petersburgh?—We can take it to St. Petersburgh.

1180. Is it *plombé* right through?—It is.

1181. Mr. *Hodgson.*] What is a ferry?—It is a difficult thing to define a ferry, but the noble Chairman illustrated the Channel Service as being a ferry—it is very much like a ferry—it is the shortest connecting link between the Continent of Europe and England. Between Holyhead and Kingstown is a long ferry, but it is the connecting link between Ireland and England; and between Morecombe and Belfast there is another such link. Those are all communications between railways in England and railways in Ireland; and I think myself that railway companies running to those ports, or similar ports, ought to have the power of employing their own steamboats. I think it would tend to the public advantage.

1182. We had the word ferry yesterday defined as being the piece of water lying between Granton and Burntisland. To-day you have defined it yourself, or the noble Chairman has defined it as being the link between Dover and Ostend?—Yes.

1183. Supposing I were going from Newcastle to Dublin by Belfast, there is a railway, is there not, from Newcastle to Silloth, and a railway from Belfast to Dublin; is the piece between Silloth and Belfast a ferry?—I should place it in that category myself.

1184. Therefore a ferry does not depend upon the distance you travel over sea?—No; whatever is a connecting link between two important corresponding places on opposite shores, you might designate as a ferry, in England, Scotland, and Ireland, at any rate.

1185. Mr. *Hutt.*] In fact, any two great ports on a line of traffic?—Yes.

1186. Sir *James Fergusson.*] From Liverpool and New York, for instance, is that a ferry?—From Liverpool to New York cannot be called a ferry.

1187. Mr. *Clay.*] Galway is nearer still to New York, do you call that a ferry?—It is a wide use of the term to call it a ferry.

1188. Mr. *Hodgson.*] If a piece of water intervenes between two railway systems, whether it be a ferry, or whether it be not a ferry, the great object of the public, and those who serve the public, would be to have that piece of water traversed with the utmost despatch and punctuality, would it not?—Yes; and with the least inconvenience and annoyance.

1189. As a general rule, will not that piece of water be traversed with the greatest despatch and the greatest punctuality, if it is under the control and management of those who have the land carriage on each side?—I think so.

1190. Sir *Francis Goldsmid.*] You referred to the competition with other ports, is it not the fact that, with respect to that numerous class of passengers who object to long sea passages, you have really no competition?—I should say not. There are some of the better class of people who go by way of Dieppe, but generally speaking, there is not much competition.

1191. With the London, Chatham, and Dover Railway Company you have made an arrangement by which, so far as fares are concerned, at all events, there is no competition?—We have made an arrangement with the London, Chatham, and Dover Company which provides beyond that arrangement with respect to fares, that through tickets issued by the South Eastern Company shall be available by the London, Chatham, and Dover Company's boats, and *vice versâ*. That is a great convenience to the public.

1192. Mr. *Hutt.*] Were you connected with the South Eastern line before the packets of the South Eastern Company were established?—No, I was not.

1193. Mr. *Kinnaird.*] The fares between London and Paris have been increased, have they not; were they not less when the South Eastern Company were alone?—When the South Eastern Company were alone, they were higher than they are now; since the opening of the London, Chatham, and Dover Railway, the fares have been reduced about 12½ per cent.

1194. Have they not been raised again?—They were reduced for about a couple of years to a greater extent than that; about 25 per cent. perhaps, but the arrangement was come to with the London, Chatham, and Dover Company, and the fares were then advanced, but not to the full extent of the reduction.

1195. The public, therefore, have benefited by the opening of the London Chatham, and Dover Railway?—Certainly.

J. C. Burns, Esq., called in; and Examined.

1196. *Chairman.*] DO you desire to offer some explanations with regard to a part of the evidence given in your hearing in this room?—Yes; the reason why I desire to express my views more fully after my father has expressed his upon the general point, is that besides being privately interested in one of the largest individual firms in the kingdom, I also publicly represent Dundee, Glasgow, Leith, Liverpool, and almost all the northern ports, in the same way as Mr. Morgan represents the southern ports; and, inasmuch as all these individual steam shipowners are affected, I should like to express my views to the Committee upon these two simple points: first, the expression of public feeling in reference to the general policy of granting these powers; and, secondly, the system of through booking which our firm carries out. Upon the point of public opinion, I have to say that in 1855, when the Glasgow and South Western, and three or four other Bills came before Parliament, the Chamber of Commerce of Glasgow, and the Merchants' House of Glasgow, and the Clyde Trust, to my knowledge, all disapproved of the granting of steamboat powers to railway companies, upon the general and broad principle of the impolicy of permitting railway companies to go beyond their undertakings. Fom that period to this, from my knowledge of the ports referred to, I can give the same evidence.

1197. When you say you represent the northern ports, do you mean that you represent the shipping interests in those ports, or the Chambers of Commerce, or what part of the community?—The steam shipowners entirely; I may mention with regard to Dundee, in the first place, that with respect to the Bills now before Parliament this year, as well as upon the general question, I have a communication from Dundee which states that the writer had seen Sir David Baxter, one of the leading merchants, and Mr. Renny, the chairman of the Chamber of Commerce, and others upon the subject, and continues: "I might confidently assert that there is only one opinion entertained by the mercantile classes of Dundee as to the danger of granting steamboat powers to railway companies." With regard to the town council of Glasgow, I have before-mentioned what they did in 1855. They took also very active measures last year after the steam shipowners were beaten, both in the House of Lords, and also in the House of Commons; and when the question was brought before the country on public grounds, the Lord Provost of Glasgow immediately called a meeting of the town council. The town council is composed, I believe, of 50 men, and as far as my knowledge goes, there is not one (there may be one, but there are very few, at any rate) of the steam-ship owners upon that Board. They unanimously agreed to petition Parliament upon the subject, and, in addition to that, they sent up the Lord Provost of Glasgow to seek the honour of an interview with the head of Her Majesty's Government. The Lord Provost saw Lord Palmerston upon that subject last year. To illustrate what I am saying, I may read a few words from this paper which I shall hand in. It mentions the Bills which were being sought for last year containing these powers.

1198. Sir *James Fergusson*]. Which Bills?—The North British Railway Company's Steamboats Bill, the Great Eastern Railway Company's Steamboats Bill, and the Morayshire Bill, none of which affected Glasgow, with the exception of the North British, and that to a very small extent. Then the petition says, "That the inevitable result of the exercise of such powers would be to transfer to the respective railway companies the whole steam shipping trade between such ports, and to prevent the rise and development of individual enterprise in the shipping trade, which has hitherto been found ample to supply the demands of commerce; and thus to produce an entire revolution in the manner in which the sea trade of the country has hitherto been efficiently conducted; that prior to the formation of railways the carrying trade of the country, whether by land or by sea, was always left to the enterprise of private parties, and competition naturally tended to ensure that the service was efficiently performed, but from the nature of the case the introduction of railways necessarily secured to the companies who were authorised to work them a monopoly of the traffic of their respective lines; while the alliances which railway companies form with each other, have enabled them greatly to extend

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that monopoly, so that while the public are deprived of the advantages which the adverse interests of different lines of railway would naturally afford, no other means of conveyance is, in most cases, capable of maintaining a competition." I need not read this paper in full, as I shall hand it in. Then with regard to the details I may mention that my father, as he stated yesterday, has for many years retired from business. I am prepared to show that through booking in connexion with our Company, is carried on as efficiently in character and by the very same means which all the railway companies with which we have connexion (and we have connexion with every railway company running to our various ports) employ among themselves; the only difference being that the railway company and we are entirely independent. With regard to our Glasgow and Belfast mail steamers running every evening, we have through booking arrangements with the Ulster Railway, and the Dublin and Belfast, and the Dublin and Drogheda Railway Companies, and also the Ballymena and Northern Counties Railway; in connexion with the railways on the Glasgow side, we have through booking arrangements with the Edinburgh and Glasgow Railway, the Caledonian Railway, and the Scottish Central Railway; and, according to the system carried out there, there are no petty charges of any description whatever. We work in intimate connexion with the railways, and we have never made any difficulty in making arrangements, either as regards passengers or goods. On the other hand, I may mention that it is rather we who have urged upon the railways the extension of facilities to us. Ten years ago, when arrangements were first made to book through to Dublin in connexion with our steamers, we were the first parties to move in it. I had to go to Dublin myself, and then it was taken in hand. Since then we have been constantly urging for greater facilities, and constantly establishing improvements. It has been the same thing on the other side with regard to the Edinburgh and Glasgow Company and others; we have urged them on in every case, and at this moment we are prepared to book throughout over our large connexion to any port where a single passenger or an ounce of goods goes. These remarks are made more with regard to the rate between Glasgow and Belfast. With regard to our line of steamers between Glasgow and Liverpool, which run, so to speak, alongside the railway, we have the like means of through booking; we through book to Havre; we run steamers between Liverpool and Havre, and, in connexion with those steamers, we through book from every station to Rouen, Paris, Strasburg, Basle, and almost every place of importance upon the Continent, wherever we can do so. Even as regards our American trade we are perfectly ready to book through; I am speaking now more with reference to the Cunard Line, and the other steamers in connexion with which our other steamers run; we are prepared to extend the same facilities to any port and any railway in conjunction with which our steamers run, so that I hope the Committee will excuse my pleading to be heard upon this subject, because I feel myself called upon to speak on the part of the steam shipowners; as regards the public, they will undoubtedly suffer more than the steam shipowners. We do not intend to give up the trade, but the independent steam shipowners will be either forced to give up the trade which we do not intend to do, or we shall have to ally ourselves with the railways, either by taking stock, or otherwise and therefore it is the opinion of the steam shipowners, and the public also, that a monopoly will be created by these means.

1199. *Chairman.*] I did not quite understand what you stated with regard to your expressing the public opinion of Dundee and Glasgow; you spoke of the Chambers of Commerce, I think?—In 1855, the Chamber of Commerce of Glasgow, and also the Merchants' House, and also the Clyde Trust, which is the Dock Board of Glasgow, all moved in the matter upon the general principles.

1200. Have you no more recent expression of opinion than that in 1855?—Yes, as late as last year. We thought it unnecessary to move further upon the subject until the matter became a public question. When it became a public question in the House of Commons, the town council took it up upon entirely public grounds, and almost unanimously decided to memorialise and petition upon all the pending Bills upon principle. They sent up the Lord Provost, who immediately communicated with Lord Palmerston upon the subject. I merely mention the latter fact to show the urgency of the question.

1201. Is

1201. Is it in your power to hand in a list of all the Chambers of Commerce or public commercial bodies who have expressed an opinion upon this subject, with the dates at which they did so?—I think I can get the information of the various memorials presented by the Chamber of Commerce at Glasgow. I can hardly go beyond Glasgow. No doubt the representatives of Hull can send in the Hull memorials.

1202. Sir *James Fergusson.*] The Clyde Trust is composed of members of the Town Council of Glasgow, is not it?—It is a mixed body. The Clyde Trust is composed of a body of 25; of those I think 15 are steamship owners, and the rest are the Town Council; the Lord Provost is, *ex officio*, the chairman of the Clyde Trust.

1203. Then the Town Council would have a considerable interest in opposing the grant of power to railway companies to run steamers, would it not?—Undoubtedly.

1204. It would militate, would it not, against the interests of the Clyde Trust?—Undoubtedly.

1205. That would partly account for their anxiety in this matter?—Not as regards the Town Council, because the Town Council element would entirely outweigh the Clyde Trust element.

1206. It could do so, at any rate?—It could do so, so far your inference is correct.

1207. The Clyde Trust element would be likely to move the Town Council in a matter of this kind, would it not?—I believe it did not do so as a fact, but it is possible that it might. Even taking the Clyde Trust, I mentioned that they had also memorialised in former cases separately.

1208. Mr. *Kinnaird.*] Was the Lord Provost of Glasgow to whom you alluded connected in any way with the shipping interest?—He is not a ship owner.

1209. He came up as representing the Town of Glasgow?—Yes.

1210. He had an interview, had he not, with the Prime Minister upon the subject?—Yes.

1211. Sir *James Fergusson.*] He is, *ex officio*, chairman of the Clyde Trust, however?—Yes.

1212. Mr. *Kinnaird.*] It was as expressing the feeling of the people of Glasgow that he saw the Prime Minister?—Yes.

1213. Did he present any memorial?—Yes.

1214. Will you hand that memorial in?—Yes; it is contained in the paper which I have already spoken of. (*The same was handed in*). *Vide* Appendix.

1215. Mr. *Hodgson.*] Do steam-vessels run from Glasgow to Liverpool?—Yes.

1216. From Glasgow to Dublin?—Yes.

1217. From Glasgow to Belfast?—Yes.

1218. Was one of the Bills which was opposed by the steamship owners, and which was remonstrated against by the Town Council of Glasgow, a Bill proposing to give power to a railway company to run steamboats to Dublin, to Liverpool, and to Belfast?—I believe so; the North British Railway Bill.

1219. And from another port than Glasgow?—From Silloth.

1220. Establishing a competing port therefore with Glasgow?—To a very slight extent.

1221. So far as the powers were sought to run steam-vessels to Belfast, to Liverpool, and to Dublin, Silloth was a competing port with the port of Glasgow; was not that the case?—To a very slight extent.

1222. To that extent?—Yes, to that extent. I believe that as regards the Dundee traffic and traffic in that direction, a certain amount might be competed for.

1223. Does that account to your mind at all for the circumstance that the shipowners in Glasgow, and the public authorities in Glasgow, should object to steam powers being granted to railway companies starting vessels from another port?—Not in the slightest.

1224. You think it was merely upon the ground of the public principle?—Merely upon the ground of principle, inasmuch as if these cases were granted to one port, they must certainly come round to Glasgow, and to the railways at Glasgow, sooner or later.

1225. Can you quote an expression of opinion from the inland mercantile

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towns, such as Manchester, Bradford, Leeds, Sheffield, and Halifax?—No, I can only talk of what I know.

1226. Do you think that the interest of the inland commercial towns upon this question would be precisely the same as the interest of the commercial ports?—I have no doubt of it, though the consequences are more indirect and less easy to see. I have no manner of doubt that if the whole matter were properly laid before them, they would come forward in the very same way.

1227. Mr. *Hutt.*] I understand that the various public bodies of whom you have spoken as expressing an opinion upon this subject, desire that the railway companies should in no circumstances be the owners of steamers?—In no circumstances, except in the case of *bonâ fide* ferries.

1228. What is a ferry?—I define a ferry to be a transit across an estuary or a river; but the way which I would define our position with respect to ferries would be this, we wish to prevent railway companies taking up sea-voyages. We ask for no privileges, we ask for the sea to be open to all, and it is upon the simple free-trade grounds that we object to railway companies getting a monopoly of the sea.

1229. Would it make much difference whether the passage were between Edinburgh and the opposite coast, or between Dover and the opposite coast?—I think there is a very great difference.

1230. What is the difference?—I think myself that in the passage across to Edinburgh the class of boats used is a class of boats especially adapted for railway purposes; at the Burntisland and Broughty Ferry they are more like a bridge: it is a peculiar mode of navigation, taking over the railway carriages as I understand. I have only been there once in my life, but I believe the carriages and everything are carried across more, as it were, upon huge barges than anything else; that is what I would define to be a ferry.

1231. The objection then that you would hold to the South Eastern Company having the power of holding steam ships which communicate between Dover and the opposite coast would be, that the carriages were not put on board the ships?—No; the objection I should have is this, that the Burntisland and Broughty Ferries are of a peculiar nature, and that it never could pay private persons to take up a system of that sort. I say that the Folkestone and Boulogne service, and all those lines which they could take up, they would do quite as well.

1232. Mr. *Hodgson.*] There was a ferry at Burntisland before the railway had it, was not there?—I cannot speak as to that; I have only crossed once. I remember seeing the boats being built at Glasgow.

1233. You are not aware that there was a ferry at Burntisland before the railway company took it?—I dare say there was; I only talk of what I have seen. I say I once crossed in that ferry many years ago; I do not know what existed previously to my seeing it.

1234. You stated it would not be worth the while of private parties to establish a ferry from Granton to Burntisland; are you not aware that that ferry was established some time ago, long before the railway company had it?—I am not aware of the fact; but even if that were so, I say that private persons were obliged to give in to the railways.

1235. With respect to the power of railway companies to employ steamboats without statutory powers, last year did you individually, or at least your firm, seek to restrain a railway company from exercising those powers illegally?—Yes.

1236. You alleged that the railway company was employing its funds illegally in this business, did you not?—Yes.

1237. Did you apply to the Court of Session for redress?—Yes.

1238. To interdict the company from doing so?—Yes.

1239. Were you successful?—The matter ceased, owing to Parliament taking it up; it had not concluded. We should have been successful, undoubtedly.

1240. Was any judgment given at all in that case?—No; because we stopped it on account of Parliament taking up the question.

1241. There was no judgment given then?—Not that I am aware of. Ours is an analogous case to the Eastern Counties Company's case, where judgment was given.

1242. In that particular instance you think you would have been able to stop the

the application of the railway funds to that purpose?—My impression is that it was possible to do so; it may not be easy to discover it.

1243. You did not do it?—No; Parliament interfered.

1244. What did Parliament do?—Parliament gave a monopoly to the company with restricted powers; it gave powers to run to one port.

1245. Mr. *Clay*.] Is it the practice of Chambers of Commerce to express their opinions upon subjects of commercial interest by resolutions at their meetings?—Generally speaking.

1246. Did you ever hear of any Chamber of Commerce, either at Manchester, Leeds, Bradford, or anywhere else, which came to a resolution that it was advisable that railway companies should have power to own steamboats?—Never.

1247. But you have heard of Chambers of Commerce which have expressed the contrary opinion?—Yes; those Chambers of Commerce with which I am acquainted have done so.

1248. And other public bodies?—Yes, and other public bodies.

1249. Do you know that for some years the Chamber of Commerce at Hull, and other public bodies there, have expressed that opinion?—I am aware of that.

1250. It seems very difficult to define what a ferry is; it appears that must be left without a definition to the ordinary understanding of men as to what it means; is not that so?—I scarcely agree in that; I think common sense teaches what a ferry is.

1251. Should you object to this definition of a ferry; the nearest route long and notoriously used for passenger traffic between two shores, not so distant but that the passage to and fro can be made in a day?—Most certainly, I should object to it.

1252. *Chairman*.] You would not accept that view of it?—Certainly not.

1253. That would include Folkestone and Boulogne, would it not?—Yes; and it would include the entire coasting trade, and that line from Glasgow to Belfast, and almost everything of that sort mentioned to the Committee in the Bills before Parliament this very year; and I may say that if it had not been for the standing order which was made two years ago, which enabled the private steam-owners to contend against the railway companies seeking such powers, we should have been obliged to give up the contest long since. A single contest cost us about 4,000*l*., and this year there are five Bills seeking powers to run steamers from no less than five ports in England, and to no less than 30 ports throughout the world, and therefore if we are beaten by the railway purse in detail, much more shall we be beaten when we come to actual competition for traffic.

1254. Sir *Francis Goldsmid*.] Questions have been asked you as to the influence of the Clyde Trust with reference to these memorials or resolutions of the Glasgow Town Council: would the Clyde Trust have any interest in the matter apart from the interest of Glasgow generally?—They have a very strong interest in this way, that if general powers were given to railways the traffic would be diverted; for instance, take the case of Ardrossan; undoubtedly, the traffic would be diverted further down the Clyde.

1255. That affects the interest of Glasgow?—Yes, and of the Clyde generally; it is not the mere fact of its being forced down, but the fact of its being forced down by unequal competition that we object to.

James Booth, Esq., called in; and Examined.

1256. *Chairman*.] I BELIEVE you are joint secretary to the Board of Trade?—I am.

1257. And you have been so for some years?—For about 13 or 14 years.

1258. Has it been your duty to prepare the various reports on behalf of the Board of Trade, which are submitted annually to the House of Commons?—It has; to superintend their preparations.

1259. In more than one of those reports have you dealt with this question of the power proposed to be given to railway companies over seagoing steamers?—We have.

1260. I need not, therefore, ask you whether you have considered it carefully,

nor whether you have had a good deal of experience in connection with the subject?—I have considered the subject a good deal.

1261. Will you favour the Committee with your views upon it?—I think it is for the public advantage that railway companies should be empowered to hold steamboats. I think that the service would be more satisfactorily performed if the railway and the steamboats were under one management, rather than that the railway should be under one and the steamboats under another management.

1262. You think that unity of management is in itself an advantage?—I think it is a great advantage.

1263. Do you consider that without such unity of management it is possible to make arrangements for through-booking at English ports, and generally for the convenience of the passengers?—I think not satisfactorily. I think that if they are under one management, the service will be more punctually performed: that the facilities for the transit of the passengers, with their luggage, from the railway to the steamboat will be greater, and the chances are that you will have a better class of boats.

1264. Have you considered at all whether it is expedient that there should be any limitations to that right which you propose to give, a limitation with respect to distance for instance?—I am not disposed to think that any limitations are desirable.

1265. Would you go so far as to allow the London and North Western Company, if they desired it, to undertake the management of the navigation over the Atlantic to New York?—If it could be shown that there was any advantage attending their having that class of steamboats, I should see no reason why they should not have the power merely because they are a railway company.

1266. Is not that the very question before us, namely, whether there is any public advantage in their possessing those powers? I speak of the public using the railways;—I am of opinion that the railway company should have the power only when it is for the public advantage; that is to say, if you can show that any public disadvantage proceeds from their possessing the powers, then I think (and it seems to me that the burden of proof is upon those who say that they ought not to have the powers) that they should not be permitted to have them.

1267. What you object to, then, is only the prohibition against railway companies possessing these powers in any case simply because they are railway companies?—Precisely so.

1268. Would you therefore leave it to the discretion of the Parliamentary Committee, in each case, to decide whether the power should be granted or not?—I would impose no restriction at all upon Parliamentary Committees.

1269. Do you not think that that would lead to a good deal of uncertainty as to the decisions of Committees, to a good deal of apparent inconsistency and vacillation in the policy of Parliament, and a good deal of additional expense to the parties contesting those Bills?—I do not know why that should be the case. If it can be shown that thereby the service can be more satisfactorily performed for the public, I think that, generally, a Select Committee, if unrestricted, would not hesitate to give the power. If it is proposed to violate any right of an existing company, then I think compensation ought to be made; but I do not think that the public ought to be deprived of the advantage of having that means of conveyance which is most satisfactory for the through transit of passengers and goods.

1270. You would simply leave the question in the hands of the Committee in each case, without any direction or advice from the House?—I should do so; if I offered any suggestion, it would be to repeal the restriction in the 142nd standing order, which prevents the Committee allowing it except upon reasons stated.

1271. That was comprised in my question because the standing order at present raises a *primâ facia* objection to the companies possessing these powers?—It does so. I should be disposed to annul that standing order.

1272. Have you considered at all a point which has been raised in this room, namely, the power alleged to be possessed by railway companies of evading the prohibition of the Legislature, and virtually owning or using seagoing steamers without Parliamentary powers for that purpose?—No case of that kind has come under my notice, so far as I remember, at the Board of Trade. We had a complaint

plaint of this kind some three or four years ago. The Aberdeen Steam Navigation Company complained that the Great North of Scotland Railway Company gave undue advantages to a rival steam company, the Northern Steam Company. I think. It was alleged, that certain of the directors of the railway company were large shareholders in the steam-navigation company. They desired that we should investigate the matter, and certify to the Lord Advocate, in order that he might put in force the provisions of the Railways and Canal Traffic Act. It appeared to us that we could not inquire into a question with respect to the persons constituting the steamboat company, but we referred the letter to the railway company, so far as related to the question of their violating the provisions of the Railways and Canal Traffic Act, for any observations which they might think fit to make. They denied the allegation, and we informed the complainants that it was not a matter which we could investigate, and that we thought there were no circumstances that would make it advisable that proceedings should be taken by the Lord Advocate rather than by the parties aggrieved, and we declined to interfere.

1273. In that case the complaint was, that persons acting as directors of a railway company had another interest, which might be a rival interest to that of the complainants, in another undertaking?—That was so.

1274. You considered that that was a matter which ought to be disposed of by the shareholders, and not a case, as I understand, which called for Government interference?—Yes, we could not interfere with that. As to the other ground of complaint, namely, that they gave undue facilities to a rival company, we interfered so far as to refer it to the railway company for their observations.

1275. How far do you think that it would be possible, assuming a railway company to be in possession of a dock of their own, and to be running a line of steamers from that for them, to give an undue advantage to those steamers of their own over other vessels using the same harbour?—No doubt they would make arrangements by which the passengers using their railway would make use of the steamboats belonging to them, because it would be more convenient to those passengers to do so. I do not know that in any other way they would be likely to give advantages to their own steam boats except, perhaps, in the transit of goods in a similar manner. I think it is quite true that railway companies have advantages in competing over steamboat companies; they have generally a larger capital, and can command a large amount of traffic, therefore of course they desire to be owners of steamboats; and I think it is not only for their own advantage but also for that of the public that they should be so.

1276. In the early days of this controversy used it not to be put forward as an argument against the possession of these powers by railway companies, that they had the advantage of limited liability which did not exist in the case of the rival associations?—That was so, and it has been the ground hitherto mainly relied upon; but that ground is now removed.

1277. Practically, almost every great undertaking is under limited liability, is it not?—It is, or it may be so; any joint-stock company of more than six persons, as a matter of course, can have limited liability.

1278. Did I understand you correctly as saying that the objection raised by the steamboat companies to the possession of this power by railway companies does not turn upon the larger amount of capital possessed by the railway companies, but upon their possessing something in the nature of a Parliamentary monopoly of the land-traffic in consequence of the nature of their undertaking?—Both grounds are put forward. The answer that I should give to the ground that a railway company has obtained extraordinary privileges from Parliament is this, that it has obtained those privileges upon the ground that they were for the public advantage; for the same reason I think they ought to be allowed to hold steamboats, namely, that it is for the public advantage as well as their own.

1279. Do you think that in practice it often happens that a railway company has the monopoly at any port with the extent to which running powers have been carried, with the arrangements that have been made between the companies, with the policy which of late years has prevailed in Parliamentary Committees of giving as much access as possible to every company everywhere; do you think that the monopoly complained of does exist in practice?—I am not able to answer

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that question distinctly; in a small port it might be so; but supposing it to be true that the giving of steamboat powers to a railway company might lead to a monopoly, I think, if there is to be a monopoly, it had better be in the hands of the railway company than of the steamboat company. I think it is a fallacy to suppose that because you withhold the power from the railway company, therefore there will be free competition.

1280. Why, if there is to be competition, is it to be better that it should be in the hands of a railway company?—Because you control the monopoly in the hands of a railway company; you limit their fares, which you do not do with reference to a steam navigation company.

1281. Would you limit their fares by sea?—By sea as well as by land.

1282. To that extent you have a hold upon them?—To that extent we have a hold upon them. Nothing would be more easy, supposing it were complained that the giving steamboat powers to a railway company would drive off any existing steamboat companies which there might be at that port than for the Select Committee upon the Bill to take care that their maximum tolls should not be higher than the average tolls of the steamboat companies for five or six preceding years, so that the fear that it might lead to a monopoly, and therefore to high charges, would be groundless.

1283. Do you think that any monopoly created, in the hands of a railway company, by giving it such a power as is here in question, is at all equal in importance to that created by one line of steamers upon a much frequented route having the exclusive conveyance of the mails?—By no means so great.

1284. In the latter case there is really something in the nature of a monopoly created, is there not?—In that case there is.

1285. That system, however objectionable it may be upon that score, has nevertheless, been generally adopted upon grounds of public policy, has it not?—Yes.

1286. Mr, *Massey.*] Assuming that the Standing Order which now prohibits the acquisition of steamboat power by railway companies to be repealed, would you recommend any general legislation with a view to restrict and control the railway companies in the exercise of steamboat powers?—It has not occurred to me that any special legislation is necessary.

1287. You think that it would be sufficient to leave every case to rest upon its own merits, and to leave it to the discretion of the Select Committee to which the project might be referred?—I think so.

1288. Sir *James Ferguson.*] Are you aware of a fact which has been stated to us in evidence, namely, that railway companies possessing steamers of their own, have sometimes established new routes, settling a very low scale of charges from point to point?—I am not aware that they have established new routes in that way; there was a case last Session, where new routes were opened by the Great Eastern Railway Company, who were allowed to run packets from Harwich and Lowstoft. Prior to that, there was no port between the Thames and the Humber whence any steamboats ran. It was not, I suppose, found to pay for steam-ship companies to establish such a service; but the railway companies, with the advantages which they have, were enabled to establish such a service to the great benefit of the public.

1289. Do you contemplate the extension of the powers to railway companies to put on steamers in connection with their lines, as a means of competing with old established routes, and diverting the traffic from them?—I contemplate their establishing a route that will pay for themselves, and be convenient for the public. No doubt it may divert traffic from some old routes that are less convenient.

1290. The new route may, or may not be less convenient?—It will hardly divert traffic from routes that are more convenient.

1291. Might not the railway company do so by charging extremely low fares?—Then the public would have the advantage.

1292. We have had it stated in evidence, that the Great Eastern Railway Company, who are charging a very low through-rate by the Harwich route, are charging a much higher mileage rate upon their local trade; do you contemplate that without aversion, as a possible consequence of the plan which you propose?—I do not know whether I am to understand that they charge a higher rate upon the land route than they charged before, or higher in proportion to the water route, or to the whole route.

1293. The

1293. The question which I wish to put to you is this; in advocating this plan as being for the advantage of the public, do you keep in view that railway companies can, and in one instance have, while putting on a very low through rate, charged a much higher local mileage rate?—I should conceive it to be possible, though in violation of their Act; but that would not be a reason with me for not allowing them to establish steamboats.

1294. Do you not think that one portion of the public might be injured by such an adjustment of rates, while another portion of the public was benefited?—Possibly; but I do not see why it should be so.

1295. May it not be that a company, in order to establish a long new route, may charge their maximum fares upon their local traffic?—Undoubtedly they might do so under extraordinary circumstances; but I should suggest that for permanently high rates the remedy would be to encourage the construction of a new line of railway.

1296. You are an advocate of very extended competition, are you not?—I am generally favourable to free competition.

1297. Mr. *Algernon Egerton.*] You say, do you not, that the advantage of the public must be solely looked to in this question of giving steamboat powers to railway companies?—I think it is mainly to be looked to; I would not violate any rights in giving the public that advantage.

1298. You say that the question of violating any prior right must be considered also?—If any right is proposed to be violated, I think compensation ought to be made.

1299. It is in your opinion an advantage to the public that free powers should be given to railway companies to own steam-ships?—That is so.

1300. Do you hold that powers with regard to any other undertaking, which is usually the object of limited liability companies, should also be granted to railway companies. Why should not a railway company own collieries or cotton mills upon the same principle?—If it could be shown to be for the public advantage, I cannot see any reason why they should not, but I cannot conceive that the public would gain any advantage from their owning a cotton mill.

1301. Supposing a railway company had a large surplus over and above a good dividend to their shareholders, would there be any objection to their holding a cotton mill or a colliery?—If the shareholders had no objection, I am not aware of any public grounds of objection.

1302. You would not prevent their doing so by any Act of Parliament?—Perhaps I may remind the Honourable Member that the powers ordinarily given to a railway company would not extend to their holding a cotton-mill or a colliery; but if in the case of any particular railway it could be shown to be advantageous that they should hold a colliery; for instance, if there were a railway which could not be constructed so as to pay unless it had that advantage, I see no reason why a Select Committee should not be allowed to give them powers to hold that colliery.

1303. You state that you would give railway companies power to hold steamboats in certain cases; would you extend that power to sailing vessels?—If it were shown to be advantageous to the public using the railway.

1304. Do you consider it any advantage for the public generally, or for national objects, that two steamboats should sail from a port instead of one, or two sailing vessels instead of one?—If they were under different managements, then, in general, it would be desirable that there should be that kind of competition.

1305. Is it not your experience, that when a railway company possesses a port they destroy competition at that port?—Not at all necessarily. It would depend on the circumstances of the port. Supposing the port is in the possession of a single steamboat company, unless you allow a railway company to hold steamboats there there is no competition.

1306. A railway company holding steamboats at its own port would necessarily, as far as we know, not allow other companies to run to any success against them, would they?—I dare say that would be the case; they would have such advantages over the other company that probably the other company would be driven off the field.

1307. In that case would you give railway companies powers to hold steamboats?—Yes.

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1308. On what principle?—On the ground of public advantage; it is convenient that the public should have the advantage of travelling from one end of their journey to another under one undivided management.

1309. In that case the restriction competition would be of advantage to the public, in your opinion?—You merely substitute one monopoly for another; there, I think, the railway monopoly is the more useful one of the two. I think you will have better boats and a more punctual packet service.

1310. Why do you call the usual steamboat companies a monopoly in that case?—I am assuming that there is only one company running boats from that port.

1311. In case it can be shown that traffic is carried to a profit, surely in most cases no steamboat company would be allowed to have the field to itself?—There is no law which would prevent the setting up of a second steamboat company if it were found to be profitable; but it might very well happen that there was only business for one company.

1312. I will read you a passage from the Report of the Board of Trade, dated March 1863, it is a quotation from the Report of 1862: "But it is not to be overlooked that the powers in question, if given to a railway company possessed of a large capital, and having the control of all the railways leading to the port at which the powers are to be exercised, might have the effect of extinguishing all competition by other parties in the lines of sea service in which the railway company engage, and the result might be that the cost of the sea service to the public would be increased, and possibly the frequency of the passages and the accommodation afforded to the public in other particulars diminished." Do you agree with that now?—It is a possible contingency, and to be borne in mind by the Select Committee on the Bill. The Report states the argument on both sides.

1313. You think it ought to be shown in order that action should be taken upon it in every distinct case?—I think it ought to be shown that disadvantage would result in every distinct case from allowing a railway company to hold the steamboats.

1314. In every case in which these disadvantages would accrue you would not allow the railway company to hold the steamboats?—If it could be shown that disadvantages to the public would accrue, I would not.

1315. It would be difficult, before the facts arose, to show whether it would or would not be a disadvantage; would it not?—I think the burthen of proof is upon those who contend that it would be disadvantageous.

1316. Railway companies, of course, like other companies, extinguish competition when they can do so; do they not?—Yes.

1317. All companies wish to have the field to themselves?—They would, no doubt, rather have the field to themselves.

1318. I suppose you have had some experience of railway companies holding a link of a canal system?—There are some cases of that kind.

1319. What has been the effect of that upon the trade and navigation of the canal?—It has been injurious.

1320. Mr. *Lygon.*] In the cases where railway companies have acquired ports such as Folkstone and Newhaven, it has been for the development of an entirely new traffic, has it not?—I believe so; but nothing of that kind comes before me officially, so that I do not know more than any other person about it.

1321. Looking to the public interest only, can you draw any practical distinction between the acquisition by the London and North Western Company of the sea passage from Holyhead to Dublin, and their acquisition of that portion of land carriage which lies between Holyhead and Chester?—No; I do not see, upon principle, any difference.

1322. *Mr. Hodgson.*] The duty of the Board of Trade is especially to look after the interests of the public, is it not?—Of all public departments, I believe that is the case.

1323. In respect of their commercial interests especially?—Yes.

1324. Having that interest particularly in your mind, the Board of Trade has come to the conclusion that these powers may beneficially be conferred on railway companies in certain cases, has it not?—I am speaking in the presence of the Vice-President of the Board of Trade; I believe the Board has come to that conclusion.

1325. Have you known, in those cases where these privileges have been granted, any injury to have resulted to the public from the privileges so granted?—I am not aware of any case of that kind.

1326. The

1326. The Board of Trade is continually having representations made to it from the public, the commercial public especially, in respect of matters which affect their interests, is it not?—Yes.

1327. From the communications which you have had with the commercial public, do you believe that the opinion of the commercial public is against the grant of this power to railway companies or otherwise, apart from the opinion of steamboat proprietors?—I have hardly had sufficient means of forming an opinion to be able to answer a question of that kind.

1328. I am only speaking of your opinion so far as it can be formed from the communications of the public to yourself, in your capacity as Secretary to the Board of Trade?—The communications we should be likely to have at the Board of Trade would be from parties feeling themselves aggrieved by the railway companies being allowed to hold steamboats; we hear nothing from the other side.

1329. I excluded them altogether from my question; would you not answer for the public opinion of the commercial interests?—No means of answering that question have been afforded by any communication that I remember to have been sent to the Board of Trade.

1330. Where a port exists, and where a railway runs to that port, and where no steamboat trade has been established, can you doubt that it would be for the benefit of the public that steamboats should ply from that port to other ports?—I have no doubt that it would be for the benefit of the public.

1331. Your opinion is, that any *primâ facie* obstacle to the grant of these powers to railway companies which now exists should be removed?—I think so.

1332. You think that in each individual case the railway company seeking powers to establish steamvessels should show that in that particular case it was beneficial to the public that those powers should be granted to it?—I think so.

1333. Mr. *Hutt.*] You have been asked whether, in the case of a railway company being the owners of a dock, it might not exercise its power prejudicially with respect to other parties owning steamboats. In the event of Parliament granting that power to a railway company, would not it be according to custom, or is not it desirable that the power should be so framed as to prevent abuses arising under it?—I think so as far as by legislative measures that can be accomplished; it has been the practice, in allowing parties to hold docks, to put them upon terms to give equal advantages to all persons desiring to use the docks.

1334. Have you any reason to believe that that measure has been unsuccessful?—I have not heard of any complaint of that being the case.

1335. In the same way, in relation to steamboat power, would it not be the policy of Parliament to frame the same regulations for the prevention of abuse in the exercise of that power which it has framed with respect to the privileges granted to railway companies as the owners of railways and docks?—A railway company, supposing it to be authorised to hold steamboats, would be placed under the same regulations with regard to the steamboats that it would be under with regard to its railway; it would be required to give the same equal facilities for the use of its steamboats that it would give for the use of its railways.

1336. And they would be under the same regulation of fares?—Yes; the fares would be regulated also in the same way.

1337. Can you give the Committee any idea of the number of cases in which Parliament has given to railway companies a steamboat power?—Not with precision.

1338. Are there many such cases?—There are a considerable number of cases.

1339. You have no reason to believe that those powers have ever been used in a manner disadvantageous to the public interest, have you?—I am not aware of any instances of that kind.

1340. Mr. *Lygon.*] Would there be any more difficulty in employing a railway company to grant through-booking for its steamboat traffic than there has been in cases where they are compelled to grant through-booking by their trains?—If you are supposing that the steam vessels are held by the railway company, I should think not.

1341. There would be no more difficulty in framing the regulations for the

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one case than for the other?—I do not see that there would be any more difficulty.

1342. Mr. *Clay.*] You have stated that if there is to be a monopoly, you think it would be better that it should be in the hands of the railway companies than of the steamboat companies?—I think so.

1343. That is taking for granted that it is necessary that there should be a monopoly somewhere?—No, I said if there be a monopoly.

1344. Is there or has there been practically any monopoly, or is it the case that at our ports there is the keenest possible competition, not only between rival steamboat companies, but between companies and individual steamboat owners?—That is not the case in Harwich or Lowestoft, I think.

1345. Those are surely the exceptions; but is there not the keenest possible competition at Liverpool, at Hull, and at Bristol?—Yes; I presume so.

1346. There may be, and no doubt there are some singular exceptions from natural causes and others, but is not it the general rule that from our great ports there is the keenest possible competition for carrying by sea, not only amongst steam companies, but between steam companies and private owners?—I should assume that that would be the case.

1347. If these powers were granted so to speak indiscriminately to railway companies, do you not think, that, from the immense capital of those companies, giving them practically the power to fight a battle of purses almost without end, and other advantages which they have in the accommodation of traffic, especially when they are owners of docks, the steamboat companies, and still more the private owners would fight such a battle, not only at a great disadvantage, but with almost a certainty of defeat?—I think that they would carry on the battle for the railway traffic at a disadvantage; as I have already stated, I think that railway companies have advantages over the steamboat companies, but I do not think they are undue advantages.

1348. They are such advantages as would make the issue of the contest scarcely doubtful, are they not?—I think that generally the railway company would be the successful competitor.

1349. Would you not then have exchanged a keen competition for a large monopoly?—Not necessarily.

1350. How so?—I did not say that the steamboat companies would be all driven off the field, but that the railway companies would have the advantage in the competition, they would carry a very large portion of the traffic undoubtedly, where it was convenient for the public to go by the railway boats rather than by the packets of the independent companies.

1351. It is a matter of opinion whether the defeat would be a total rout, or only a considerable loss, but the evidence we have had on the one side goes far enough to create a fear that the steamboat companies, and still more private owners, would be driven off the field, and your own report appears to me in the passage which was read to you by an honourable Member to day, to go very nearly to that length; you, yourself, allowed that the contest would be greatly in favour of one party; we know how these contests end, and supposing this contest to end, as there is every probable reason for fearing, in the destruction of the steamboat interest, would you not then have exchanged that which is at present a free and lively competition for the monopoly of the railway companies?—I think that the steamboat companies probably would suffer, but I think that the public would derive advantage; that is to say, a large portion of the traffic of the steamboat companies would be absorbed by the railway company, and to the advantage of the public.

1352. The suffering of a railway company, or a steamboat company, or a private ship owner, means that he is ruined, and quits the business; then you would have exchanged, as I say, competition for monopoly; do you see any public advantage in that?—Yes, I do; I believe that the public would be served more advantageously than before; at any rate, people desiring to travel by railway, and to cross the sea.

1353. On cheaper terms?—Probably on cheaper terms, and in better vessels, and with more punctuality and comfort.

1354. Is it the result of your experience in other matters (because in this particular business we have not had any experience as yet), that the public is better served, and upon cheaper terms by a monopoly?—I believe that the circumstances

circumstances here are peculiar; take the case of London and Holyhead; there is no question that the public is better served now since the London and North Western Railway Company have been enabled to hold steam-ships than they were before; the existing companies were unwilling to make such improvements in the steamboats as the public demanded, and that was one of the grounds upon which the Committee allowed the London and North Western Company to hold steamboats in connexion with their Railway.

1355. You mean between Holyhead and Kingstown?—Yes.

1356. Does not it appear to you that the greater part of that improvement is not owing so much to an improved management, as compared with the old management, as to this fact, that the developement of the railway system brought out an immense traffic by that route, which never existed before; and do you doubt that whether the railway company had got those powers or not, the service between Holyhead and Kingstown would equally have been very greatly improved, simply from the fact that it had become the shortest and best route, which it was not before?—It might possibly have been improved, but I do not think it would have been equally improved.

1357. At any rate you do not think it fair to take the old system of passage between Holyhead and Kingstown and compare it with the present one, and to say that the whole of the improvement is owing to the London and North Western Company having had power to hold steamers?—No; I think that it is a remarkable illustration of what I wished to say, that is all.

1358. You do not doubt that if the London and North Western Company had not got those powers there would have been, as a matter of course, a very vastly improved service upon that line, conducted by some other parties?—I think probably there would have been some improvement as the traffic increased, but I do not think it would have been to the same extent, or have taken place so early as it has done by allowing the railway company to become the owners of steamers. The select Committee in their special report on the Bill for sanctioning the union of the railways and steamboats under one management, state that although the defects of the previous communication between Holyhead and Kingstown were notorious, no proposal for its improvement had been made.

1359. Supposing this case were put to you now, there is at present a port in which there is active competition carried on between steam companies and private ship owners, by giving these powers to a railway company running to that port, you will send all those vessels off the seas, and leave the railway company with a practical monopoly, should you consider that the increased public convenience was so great that you would say, "Let it be so?"—I would.

1360. Sir *Francis Goldsmid.*] You mentioned that you thought that as a general rule the railway companies could make arrangements for through booking when they had the ownership of steam-vessels which could not be made by railway companies with steamboat companies or steamboat owners. Has your attention been directed to the arrangements for through booking made by the steamboat companies and proprietors trading to Ireland with the Irish railway companies?—My attention has not been particularly directed to that subject. I am not aware that I did say what you state, but I believe it would be so—that arrangements for through booking could be made much more conveniently supposing the steamboats to be in the possession of the railway company than if they were under the management of a distinct company.

1361. Your attention has not been directed to the through booking arrangements which have been made between the Irish railway companies and the proprietors of steamboats trading to Ireland?—My attention has not been directed to that point.

1362. Mr. *Algernon Egerton*]. As to the Dublin and Holyhead service, which you instanced just now as having been a great advantage, resulting from giving to a railway company steamboat powers, are you aware that that service is conducted by an independent company, and not by the London and North Western?—The particular shares that the London and North Western, and the City of Dublin Steam Packet Company have in the ownership of the vessels I am not acquainted with, but powers were given by Act of Parliament to the railway company to hold steamers in connection with their railways.

1363. You are not aware that they have not exercised those powers, but have contracted with an independent company?—I am not minutely acquainted with

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the arrangements, but the management of the vessels is not independent of the railway company.

1364. Mr. *Hutt*]. Practically the boats are under the control of the London and North Western Railway Company, are they not?—They are entirely under their control.

1365. Sir *James Fergusson*]. But they are not their boats?—No; so it is alleged.

1366. Mr. *Clay*]. You were asked some questions just now about canals; have you any knowledge of any instances in which railways have bought canals purposely to shut them up, and to carry the whole traffic over their line?—Complaints have been made to the Board of Trade that in one or two instances a short link of canal has been bought by a railway company, and the rates so far raised as practically to amount to a prohibition upon using the canal.

1367. That was not a public convenience, although it established a monopoly, was it?—Quite the contrary; I am not in favour of monopolies, but some monopolies are less mischievous than others.

William Conway Morgan, Esq., called in; and further Examined.

W. C. Morgan, Esq.

1368. *Chairman.*] I believe you have some statement which you wish to make with regard to evidence which you have just heard in this room?—I wish to state with reference to what was said by the last witness about the connection between the London and North Western Railway Company and the City of Dublin Steam Packet Company, that the Railway Company have no control over the steamboat company. The capital is distinct, and the packet boats are the boats of the City of Dublin Steam Packet Company. There is no such connection between them as seemed to be alleged.

APPENDIX.

LIST OF APPENDIX.

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APPENDIX.

Appendix, No. 1.

PAPERS handed in by Mr. *Lumsden*, 9 March 1864.

LIST of PLACES to which Messrs. *Brownlow, Lumsden & Co.* have THROUGH RATES.—1864. Appendix No. 1.

Messrs. Brownlow, Lumsden & Co. have through rates between—

Liverpool.	Manchester.
Preston.	Blackburn.
Rochdale.	Halifax.
Bradford.	Leeds (and surrounding districts).
Wolverhampton.	Birmingham.
Pottery and Iron Districts.	Derby.
Leicester.	Nottingham.
Sheffield.	Rotherham.
Lincoln.	Edinburgh.
Glasgow.	Dundee;

and, in fact, all the manufacturing districts of England and Scotland, to and from all places on the Continent having Railway communication from the ports to which their steamers go, viz.:—

Dunkirk.	Antwerp.
Rotterdam.	Hamburgh.
Gestemonde (Bremen).	Konigsberg, and
Cronstadt;	

which rates include all charges from senders to receivers.

Appendix, No. 1.

LIST of STEAM VESSELS sailing from *Hull*.—1864.

Name of Steamer.	Registered Tonnage.	Owners or Agents.	Destination.
Leopard	500	Brownlow, Lumsden & Co.	Cronstadt.
Panther	564	- - ditto	St. Petersburgh.
Nautilus	526	- - ditto	- ditto.
Tiger	442	- - ditto	Hamburgh.
Zebra	426	- - ditto	- ditto.
Falcon	347	- - ditto	Antwerp.
Martlet	169	- - ditto	Harburg.
Prince	290	- - ditto	Antwerp.
Transit	331	- - ditto	Dunkirk.
Gazelle	269	- - ditto	- ditto.
Orient	516	- - ditto	Stettin.
Dwina	547	- - ditto	- ditto.
Gertrude	527	F. Helmsing & Co.	Riga.
Alexandra	263	Z. C. Pearson & Co., afterwards Reinold & Co.	Stettin.
Emilie	275	- - ditto	- ditto.
Alster	299	Gee & Co.	Antwerp.
Helen M'Gregor	435	- - ditto	Hamburgh.
Emerald Isle	368	- - ditto	- ditto.
Pacha	284	- - ditto	- ditto.
Sultana	358	- - ditto	St. Petersburgh and Cronstadt.
Emperor	914	- - ditto	- ditto.
Britannia	383	Thos. W. Peters	Hamburgh.
Hammonia	242	- - ditto	- ditto.
Archimede	245	- - ditto	- ditto.
Urania	475	- - ditto	- ditto.
Roland	437	- - ditto	- ditto.
Harlequin	245	Lofthouse, Glover & Co.	Harburgh.
Excelsior	285	- - ditto	- ditto.
Parthenon	701	R. Hammond	Cronstadt.
Sea Gull	355	W. H. H. Hutchison	Rotterdam.
Hawk	260	- - ditto	Havre.
Swanland	381	W. and C. L. Ringrose	Danzig.
Irwell	467	- - ditto	- ditto.
Sea Horse	335	- - ditto	Rotterdam.
Alert	175	- - ditto	- ditto.
Minister Thorbecke	175	- - ditto	Harlingen.
Enchantress	170	W. A. Deplidge & Brothers	Rotterdam.
Ocean Queen	175	- - ditto	- ditto.
Albert	450	- - ditto	- ditto.
Bolderaa	443	C. M. Norwood & Co.	St. Petersburgh.
Octa	464	- - ditto	- ditto.
Volga	577	- - ditto	- ditto.
Dwina	578	- - ditto	- ditto.
Argo	482	Thos. Wilson, Sons & Co.	Gothenburgh.
Scandinavian	323	- - ditto	Christiania.
Humber	465	- - ditto	Stettin.
Ouse	601	- - ditto	St. Petersburgh.
Pacific	575	- - ditto	Cronstadt.
Dido	850	- - ditto	Alexandria.
Juno	869	- - ditto	- ditto.
Oder	556	- - ditto	Gothenburgh.
Albion	769	- - ditto	Cronstadt.
Cossack	739	Bailey & Leetham	- ditto.
Labuan	751	- - ditto	- ditto.
St. Petersburgh	460	- - ditto	- ditto.
Queen of Scotland	421	- - ditto	Tonning.
Zealand	369	- - ditto	Konigsberg.
Jutland	269	- - ditto	- ditto.
Era	437	- - ditto	St. Petersburgh.
Delta	454	- - ditto	- ditto.
Ida	492	- - ditto	- ditto.
Ranger	308	- - ditto	- ditto.
Queen Victoria	1,434	- - ditto.	
Czar	414	Priest Brothers	St. Petersburgh.
Humboldt	362	- - ditto	- ditto.
Henrietta	300	- - ditto	- ditto.

Name of Steamer.	Registered Tonnage.	Owners or Agents.	Destination.
Swallow	216	G. Lawson, jun. & Co.	Rotterdam.
Ganges Rolff	391	Thos. B. Mosley & Co.	Christiania.
Anna	232	J. A. Dunkerly & Co.	Bergen.
Amicitia	199	- - ditto	- ditto.
Falke	408	N. Veltman & Co.	Bremen.
Condor	509	- ditto	- ditto.
Schwann	411	- ditto	- ditto.
Mowe	372	- ditto	- ditto.
Schwalbe	439	- ditto	- ditto.
Adler	395	- ditto	- ditto.
Secret	321	- ditto	- ditto.
Urania	239	- ditto	Amsterdam.
Rubbens	187	- ditto	- ditto.
Cyclop	231	- ditto	- ditto.
Seine	193	- ditto	- ditto.
Eurs	166	C. H. Knapp	Leer.
Grafram Rechterer	144	Krutise & Timm	Kampen.
Twenthe	197	- ditto	- ditto.
Phœnix	388	Salhgreen & Carrall	Copenhagen, &c.
Smyrna	219	- ditto	- ditto.
Odin	273	- ditto	- ditto.
Lucien	343	R. Hammond	Havre.
Ida	170	F. Pope	Nantes and Boulogne.
St. Elmo	181	F. Pope	Malaga.
Sir Edward Banks	180	General Steam Navigation Company.	London.
Vivid	228	- - ditto	- ditto.
William Jolliffe	197	- - ditto	- ditto.
Waterwitch	276	- - ditto	- ditto.
Onda	797	Bailey & Leetham	Cronstadt.
Columbine	56	Gainsborough Steam Navigation Company.	Gainsborough.
Harlequin	74	- - ditto	- ditto.
Diana	292		
Eva	919	Bailey & Leetham	Cronstadt.
Ada	967	- - ditto	- ditto.
Aberdeenshire	150	William Dyson, jun.	Aberdeen.
Agenoria	190	Bailey & Leetham	Konigsberg.
Buccleuch	145	Yarmouth Company	Yarmouth.
Colin Campbell	8	Grimsby Company	Grimsby.
Colletis	216		
Colocotronis	235		
Brilliant	215	Hull and Leith Steam Company	Leith.
Queen	193	Dundee Steam Company	Dundee.
Eagle	220	- - ditto	- ditto.
Czarina	420	Priest Brothers	Cronstadt.
Vanguard	515	Bailey & Leetham	- ditto.
Vigilant	169	General Steam Company	London.
Jos. Somes	-	Brown, Atkinsons & Co.	Balbec.
Earl de Grey	515	Bailey & Leetham	- ditto.
North Eastern	426	Wilson, Sons & Co.	- ditto.

Appendix, No. 2.

PAPERS handed in by Mr. *Burns*, 10 March 1864.

Appendix, No. 2.

STEAM FLEET in which Messrs. *G.* & *J. Burns* are interested.

	Vessel.	Tonnage.		Horse Power.	
British and North American Royal Mail	America	1,826		650	
	Niagara	1,825		650	
	Canada	1,831		670	
	Europa	1,918		700	
	Africa	2,226		750	
	Asia	2,227		750	
	Arabia	2,393		830	
	Persia	3,300		900	
	Australasian	2,761		700	
	China	2,529		550	
	Scotia	3,870		1,000	
	Cuba	3,000		600	
	Java	3,000		600	
	Corsica	1,134		190	
	Subsidiary:				
	Satellite (Tender)	157		80	
	Jackal (Tender)	180		100	
			34,177		9,720
Atlantic	Kedar	1,783		250	
	Olympus	1,794		250	
	Hecla	1,785		250	
	Sidon	1,782		250	
			7,144		1,000
Mediterranean	British Queen	763		150	
	Palestine	1,377		260	
	Marathon	1,784		250	
	Morocco	1,783		250	
	Atlas	1,794		250	
	Tripoli	2,061		280	
	Aleppo	2,061		280	
	Tarifa	2,061		280	
	Dido	1,323		150	
	Cronstadt	1,118		250	
	St. Patrick	1,102		250	
			17,227		2,650
Havre	Balbec	838		150	
	Stromboli	734		100	
	Czar	895		135	
			2,467		385
Glasgow and Liverpool	Heron	624		150	
	Ostrich	624		150	
	Penguin	680		180	
			1,928		480
Glasgow and Belfast	Stag	499		240	
	Lynx	499		240	
	Wolf	670		300	
	Roe	553		265	
	Fox	553		265	
	Beagle	500		110	
			3,274		1,420
			66,217		15,655

STATEMENT of Through Booking by Belfast and Liverpool Steamers.

Messrs. *G.* and *J. Burns* have the following Through Booking Arrangements with the following Railway Companies, viz.:—Caledonian Railway, Edinburgh and Glasgow Railway, Scottish Central Railway, Scottish North Eastern Railway, North British Railway, Ulster Railway, Dublin and Belfast Junction Railway, Dublin and Drogheda Railway, Belfast and Northern Counties Railway, and the Forth & Clyde Canal and Bridgwater Canal.

GLASGOW AND IRELAND.

PASSENGERS:

First Class and Cabin, single and return; and Third Class and Steerage, single.

Glasgow, Greenock and Paisley.

Vid Belfast Royal Mail Steamers and Ulster - - - / Dublin and Belfast Junction - - - / Dublin and Drogheda	Railways.	To and from— Portadown. Armagh. Newry. Dungannon. Monaghan. Omagh. Clones. Dundalk. Drogheda. Dublin.
Vid Belfast Mail Steamer - - - and Belfast and Northern Counties Railway - - - - -		Antrim. Randlestown. Ballymena. Magharafelt. Cookstown. Ballymoney. Coleraine. Portrush. Londonderry.

Belfast.

Vid Belfast Mail Steamer - - and Edinburgh and Glasgow - - - / Scottish Central - / Scottish North Eastern - - -	Railways.	To and from— Edinburgh Stirling. Alloa. Dumfermline. Perth. Dundee.

Londonderry.

Vid Belfast and Northern Counties Railway - - - - / Mail Steamers, and - - - / Edinburgh and Glasgow - - - / Scottish Central - / Scottish North Eastern - - -	Railways.	To and from— Edinburgh. Stirling. Alloa. Dumfermline. Perth. Dundee.

GOODS:

Glasgow and Greenock.

Vid Dublin and Drogheda - - / Dublin and Belfast Junction - - - / Ulster - - -	Railways.	From— Portadown. Armagh. Newry. Dungannon. Monaghan. Omagh. Clones. And to— Dundalk. Drogheda. Dublin.
Belfast Mail Steamers - - and Belfast and Northern Counties Railway - - - - -		To or from— Ballymena. Ballymoney. Coleraine.

Belfast.

Belfast Mail Steamers, and Edinburgh and Glasgow - - - / Scottish Central - / Scottish North Eastern - - - / Perth and Dundee -	Railways.	To— Dumfermline. Dysart. Leslie. Markinch. Kirkcaldy. Sinclairtown. Strathmeigle. Kingskettle. Newburgh. Falkland Road. Cupar. Auchtermuchty. Thorton. Cowdenbeath.

Belfast.

Belfast Mail Steamer - - / Forth and Clyde Canal - - and Leith Continental Steamer -		To and from— Hamburgh. Altona. Stettin. Rotterdam. Dunkirk. Lille.

Belfast.

Belfast Mail Steamer - - and Edinburgh and Glasgow Railway, also Caledonian - -		To and from Leith. Edinburgh.

Note.—Wherever there is competition in traffic to or from any place or station in interior, or beyond our own terminus proper, we lose no time in arranging a suitable through rate with the other Companies interested, whether Rail or Canal.

(signed) *G. & J. Burns*,
per *Robert Mills.*

STATEMENT of Through Bookings by Belfast and Liverpool Steamers—*continued.*

GLASGOW AND LIVERPOOL.

Per Liverpool Steamer.

PASSENGERS:

1st Class and Cabin—Single and Return.
3rd „ and Steerage—Single only.

GLASGOW.

Viâ Liverpool Steamers and Great Western Railway - To and from—
Paddington.
Windsor.
Reading.
Basingstoke.
Chippenham.
Oxford.
Banbury.
Leamington.
Warwick.
Birmingham.
West Bromwich.
Wednesbury.
Bilston.
Wolverhampton.
Wellington.
Shrewsbury.

GOODS.

GLASGOW AND GREENOCK.

Viâ Liverpool Steamers and Bridgewater Canal - - To and from—
Manchester.
Warrington.

GLASGOW.

Viâ Liverpool Steamer - - Steamer to Havre, thence Railway - - - To—
Havre.
Rouen.
Paris.

GLASGOW.

Liverpool Steamer and Great Western Railway - - To—
Birmingham and other Stations on Great Western Railway.

LIVERPOOL AND CONTINENT.

Goods are carried at through rates to and from the undermentioned places.

Liverpool to - - - Rouen.
Paris.
Dunkirk.
Forbach.
Strasburg.
Wissembourg.
Bali.
Dieppe.
Malhouse.
Lisieux.
Caen.
Honfleur.
Dunkirk.
Rochefort.
Bolbeck.
Avignon.
Zurich.
Brest.
Cherbourg.
St. Malo.
Geneva.
Rheims.
Lille.

Liverpool to - - - Lyons.
Thurn.
Calais.
Marseilles.
Linneville.

Havre to - - - - Manchester.
Dublin.
Glasgow.
Greenock.
Blackburn.
Bradford.
Stockport.
Belfast.
Sligo.
Birmingham.
Bolton.
Huddersfield.
Leeds.
Rochdale.
Staffordshire.
Kingston.

NAMES of Steamboat Owners in the Irish Clearing House.

Belfast Steam Ship Company.
G. and J. Burns.
City of Dublin Steam Packet Company.
Clyde Shipping Company.
Cork Citizen's River Steamers Company.
Cork Steam Ship Company.
Dublin and Glasgow Steam Packet Company.
R. Henderson & Son.
Kemp & Co.
Waterford Steam Ship Company.

Appendix, No. 3.

PAPER handed in by Mr. *Morgan*, 11 March 1864.

General Association of Proprietors of Steam Shipping.

Rules and Regulations.

The Members of the Association for the Protection and Promotion of the General Interests of British Steam Shipping, have agreed to the following Rules and Regulations for the establishment and government of the said Association, which are to be binding on every Member thereof:—

I.—That the association be called the General Association of Proprietors of Steam Shipping, and do consist of owners of steamers under the British flag, who shall contribute to the funds of the association, and shall consent to these rules and regulations.

II.—That the objects of the association shall be—the protection and advancement of the common interest of proprietors of steam shipping; the amelioration of legislative enactments interfering prejudicially with steam navigation; the constant and efficient supervision of legislative proceedings, whether applying to local or general objects, wherein any principle affecting generally the fair rights of steam ship owners may be involved; the especial consideration of all questions, public or individual, directly or indirectly connected with the steam marine; the instant communication with Members of the Government and the Houses of Parliament upon all matters connected with this branch of property, involving immediate consideration; and, generally, the redress of all grievances, the removal of all unjust burthens and restrictions, and the attainment of all beneficial objects which may affect the general or particular interests of owners of steamers, contributing to the association, where such designs can be promoted more effectually by an associated body than by individual exertion; the association, in objects of general interest, undertaking the conduct of such proceedings as may be necessary, but in local and particular questions confining its operations, as a general rule, to acting in aid of the parties immediately affected.

III.—That the association shall be supported by a *pro ratâ* contribution of (and in no case to exceed) 6*d.* per ton per annum, upon the registered tonnage of the steamers belonging to the company or individual that may join the association; and further, in no case shall any single contribution exceed 100*l.* a year.

IV.—That of the sum to be contributed, one-half shall be payable annually, on the 1st of January in each year, and the remainder as and when called for by the committee.

V.—That every company or individual owning steam ships, whose *pro ratâ* contribution to the funds of the association, after the rate of 6*d.* per ton per annum, would amount to 50*l.*, shall be entitled to name a representative in the committee, to be elected in such manner, and changed as often as the party subscribing may think proper; and companies, established in one port, whose individual subscriptions would not entitle them separately to elect a representative in the general committee, shall be entitled to join together for that purpose; but every such representative shall be an owner, or shareholder, or agent (not being a legal practitioner), of steamers contributing to the association.

VI.—That the affairs of the association shall be conducted in London, by a committee to be composed of the representatives named or elected as before provided, and of seven members in addition, to be elected at the annual general meeting by the subscribers generally; three of that number to retire annually by ballot, and to be eligible for re-election at that or any ensuing general meeting.

VII.—That the first appointment of the seven members of the committee to be elected by the subscribers, shall be made at the general meeting of the association by which the present rules shall be established, and the same and all future appointments shall continue

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in force until the general meeting, which shall be held in the month of February in each year; during which month a general meeting of the association, to be convened by notice to each subscriber through the post office, sent not less than ten or more than twenty days before such meeting, shall be held for the purpose of appointing a committee for the year ensuing.

VIII.—That at the annual general meeting there shall be elected a chairman of the association for the ensuing year, who shall be entitled *ex officio* to preside at all committees and meetings of the association.

IX.—That subscribers be entitled to vote according to the amount of the registered tonnage of their steam ships, and on the following scale, namely,

Not less than		100	tons	1 Vote.
„	„	400	„	2 „
„	„	1,000	„	3 „

and for every additional 1,000 tons one additional vote, but no party shall be entitled to more than 10 votes in the whole.

X.—That the committee shall fix the time and place of all meetings, and appoint the officers of the association, and fix and alter the salaries at their discretion; and shall take upon themselves the management, and have the absolute control of the funds as respects all the ordinary and current business and expenses of the association; and at every annual general meeting, a statement of the receipts and expenditure of the association, with a report of proceedings for the preceding year, shall be laid before the subscribers.

XI.—That at all meetings of the committee there shall be a quorum of not less than three, and if the chairman of the association be not present, the members present shall elect a chairman for the day, and at all meetings, as well general as special, the proceedings shall be entered in a book, and be signed by the chairman of such meeting.

XII.—That special meetings of the association may be convened at any time by the committee when such shall be deemed necessary, notice being given by the secretary in the manner provided for annual general meetings.

XIII.—That when, at any meetings of the association, questions shall arise among the members, the sense of the meeting shall be ascertained by vote by ballot, in case a ballot shall be demanded, in writing, by any three of the members present.

XIV.—That subscribers shall be entitled to vote at all general and special meetings of the association by proxy, provided the party acting as proxy be not a legal practitioner, and be authorised in writing, and be a proprietor in, or agent of, a company subscribing to the association.

XV.—That at all meetings, whether special, general, or in committee, the chairman shall always possess a second or casting vote when needful.

XVI.—That the duty of the secretary shall be, to keep the registry of ships entered and subscribed for, as entitling their owners to be members of the association; to watch all Parliamentary proceedings, and report to the committee thereon from time to time, as occasion may require; to issue notices of all meetings of the association and committees; to attend at all such meetings; and to enter the proceedings and resolutions thereof in a book to be kept for that purpose; to collect the funds of the association; to keep a fair account of receipts and expenditure, and to exhibit the same, with vouchers, when called upon by the committee so to do; and generally to manage the affairs of the association under the instruction of the committee.

XVII.—That the rules and regulations hereby made may be altered or repealed at any annual general meeting of the association by a majority of votes, provided notice in writing of any alteration proposed to be submitted to such meeting shall have been given to the secretary, by members contributing upon at least 3,000 tons, before the 15th of January in every year; and the secretary, in the circular convening the annual general meeting, shall give notice of the alteration so intended to be submitted.

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PAPER handed in by Mr. *James Burns*, 11 March 1864.

Appendix, No. 4.

GLASGOW.—TOWN COUNCIL PROCEEDINGS.

A MEETING of the Town Council was held yesterday in the Council Chambers—the Honourable the Lord Provost presiding.

WORKING OF STEAMBOATS BY RAILWAY COMPANIES.

The LORD PROVOST said he had to bring before the Council a matter very seriously affecting the interests of the public, and having reference to some Railway Bills which had been this season introduced into Parliament. They were all aware that, as a result of railway operations, the companies had monopolised the whole land-traffic of the country, or nearly so; and it was now sought to add to that the purchasing or subsidising of steamers to be carried on in connection with these railways, the cost to be paid out of their capital, and any loss that might accrue out of their revenue. This was a matter seriously affecting the general interests of the public, both as shipowners and as shippers; for while shipowners were quite ready to compete with distinct steam-companies trading from one point of the United Kingdom to another, bearing their own loss, and of course sharing their own profit, they objected to that loss being brought in as against the revenue of a railway company, the effect of which would ultimately be to drive out competition on the part of private companies, and leave them as a class completely at the mercy of these railways. In respect of our own city the effect might be very serious. He might mention that Bills had been brought forward on the part of the North British Railway, the Great Eastern Railway, and the Morayshire Railway. These Bills were first brought before a Committee of the House of Lords, and received their sanction. This was contrary to the general principle of the House of Commons, which was to the effect that this steam-traffic should only be conceded in special cases, where necessary for ferries, or where absolutely necessary for the general interests of the country, such as the case of the Dublin and Holyhead Line. These railways, having obtained sanction in the House of Lords, were still opposed and brought before a Committee of the House of Commons; and in opposition to the opinion of the Chairman, a very eminent man, and well acquainted with railway matters, the concession was granted to them by a majority of one. The matter, however, was of such great importance that the shipping interest had thought it right to endeavour to get it thrown out upon the third reading, which was about coming on. But whilst they asked these Bills to be thrown out, they also asked that a Committee be appointed, consisting of 15 Members of the House of Commons, to take evidence, and settle once and for ever the principle whether these concessions were to be granted, so that one railway might not obtain this year a concession which had been refused to another in the previous year. With respect to our own city, the effect of these railways obtaining the power sought would be that they might expect next year to find the three great leading lines which came into Glasgow applying for similar powers;—the Glasgow and South-Western asking powers for steamers from Ardrossan, the Caledonian and South-Western from Renfrew, and the Edinburgh and Glasgow for power to run steamers from Bowling, which they were very anxious to do, thereby depriving our River Trust of five-sixths of the revenue, because goods shipped at Bowling only paid one-sixth of the dues. He thought the subject, therefore, of such great importance to the mercantile community, who desired to keep up a fair and healthy competition in the traffic of goods, that he would ask the Council to present a petition to the House of Commons against these Railway Bills, a draft of which petition the Town Clerk would read. He might also remind them that the Council had on previous occasions contested very strongly, and at great expense, against railway amalgamation; but evil as the consequences might have been from that, he looked upon the present case as likely to involve consequences ten times more injurious.

Mr. MONRO (Town Clerk) then read the draft of the proposed petition, as follows:—

"To the Honourable the Commons of the United Kingdom of Great Britain and Ireland, in Parliament assembled.

"The humble Petition of the Lord Provost, Magistrates, and Council of the City of Glasgow, under their Corporate Seal,

"Showeth,—That the City of Glasgow, which your petitioners represent, is a port very extensively engaged in shipping, both with home and foreign ports, as well as the centre

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of a large and rapidly increasing manufacturing district, and an emporium for all descriptions of merchandise. That your petitioners have learned, with regret and alarm, that a Committee of your Honourable House have reported in favour of the three following Bills:—North British Railway (Steamboats); Great Eastern Railway (Steamboats); and Morayshire Railway (Additional Capital and other Purposes). That the powers granted by these Bills enable the railway companies on whom they have been conferred to become proprietors of or to subsidise steamvessels to ply between certain specified ports at which the respective railways terminate and certain other home and continental ports. That the inevitable result of the exercise of such powers would be to transfer to the respective railway companies the whole steam-shipping trade between such ports, and to prevent the rise and development of individual enterprise in the shipping trade, which has hitherto been found ample to supply the demands of commerce; and thus to produce an entire revolution in the manner in which the sea trade of the country has hitherto been efficiently conducted. That prior to the formation of railways the carrying trade of the country, whether by land or by sea, was always left to the enterprise of private parties, and competition naturally tended to ensure that the service was efficiently performed; but, from the nature of the case, the introduction of railways necessarily secured to the companies who were authorised to work them a monopoly of the traffic of their respective lines, while the alliances which railway companies form with each other have enabled them greatly to extend that monopoly; so that, while the public are deprived of the advantages which the adverse interests of different lines of railway would naturally afford, no other means of conveyance is, in most cases, capable of maintaining a competition. That the circumstances which necessarily created this practical railway monopoly on land, and naturally led to its extension, do not exist in the case of traffic conveyed by sea, and consequently the sea has remained, as formerly, a highway open to the competition of all; and the trade continues for the most part in the hands of persons whose entire fortunes are risked in it, and who, from the personal responsibility they daily incur, and from the wholesome pressure of competition, have the strongest reasons for efficiently maintaining and actively developing the mercantile marine service of the country. That if the decision of the Committee of your Honourable House on the three Bills to which your petitioners have referred were sanctioned and extended to other railway companies applying for similar powers, a competition ruinous to private sea-traders would naturally ensue, if indeed they did not in prudence retire, declining to risk so irregular a contest: for, besides the enormous capital, influence, and resources of railway companies, they would, in such a contest, be willing to sustain a loss on seaborne traffic, which could be compensated by increased charges on land-carriage, so that the deficiency would be inappreciable. That the natural effect on the public of such an extended monopoly would be to increase the expense and diminish the efficiency of the sea-service.

"May it, therefore, please your Honourable House not to pass the said Bills into law; and your petitioners will ever pray."

Mr. Buchanan seconded the motion proposed by the Lord Provost. He would not detain the Council with many remarks, as his Lordship had explained the matter pretty fully. He might, however, be allowed to say that an objection made in his hearing to public bodies moving in such a case was that these Bills concerned private interests alone, and were matters which public bodies should not interfere with. He could not take this view of the question. They did not bear alone upon private interests, but very directly and seriously upon public interests also; and the proposal for railway companies taking up steamboats had always been regarded as a matter of very great public interest. Many applications had been made—as gentlemen present were doubtless aware—for such powers as were very nearly granted to these companies, but they had been uniformly refused, until in 1848, in the time of Sir Robert Peel, it came to be a subject of discussion whether a general principle should not be observed in dealing with such applications; and it was then passed as a resolution of the House of Commons, which had ever since been acted on, that steamboat powers could only be granted to railway companies for sea-passages of the nature of a ferry—that was for the more convenient service of an existing passenger traffic requiring unbroken connexion with a railway system. Now, although in almost every Session since then powers had been asked by railway companies, they had been invariably refused. He should, however, remark that in 1848 the London and North Western Railway obtained powers to run vessels between Holyhead and Dublin, but this was distinctly of the nature of a ferry, and in order to afford a more rapid communication for mails. A great public benefit was to be gained, and private interests were not to be interfered with. The only other Bill passed up till the present year was one to give power to one of the Eastern Railway Companies to run vessels to the Continent, but it was given under some misapprehension, or in consequence of some misrepresentation, and the power was considerably reduced at next Session of Parliament. The resolution brought forward by Sir Robert Peel had been uniformly acted upon, and it was only now that it came to be disregarded. He thought it could scarcely be contended that this had ever been regarded as other than a public matter, or that they were not entitled so to look upon it. They should regard it in this light also, that the establishment of communication by railway had required enormous capital, in consequence of the very heavy work which had to be done throughout the whole country. They stood in a very different position from sea-traffic, because the sea was a high-road ready made to our hands, which was open to great and small—to a cock-boat as well as to a line-of-battle ship. It was open to all traders, and he thought it could hardly

hardly be said that they had not taken advantage of it, either for the sake of the public or for their own sake. The question was, whether Parliament was to authorise these private companies being overborne altogether by the very large associations which had been gathered together for the purpose of carrying through railway communication. They all knew the enormous amount of capital possessed by those companies. Their capital was not now to be estimated by millions, but by tens of millions; and it was mere folly to expect that any private company could compete with them in any undertaking which they chose to enter into. The danger was, therefore, of the greatest possible magnitude to private companies, and he was perfectly certain that if it were generally allowed, private steamers for short voyages would disappear altogether in the course of a few years. The communication would be entirely in the hands of railway companies, as it would be quite impossible for private companies to exist. The railway companies proposed to take to themselves the power of paying the small losses accruing upon their steamboats out of the hundreds of thousands of pounds of revenue derived from the land-traffic; so that the loss would never be noticed at all in their case, while it would be ruinous to a private trader. It was the avowed object of the promoters of the Bill to do away with the principle established by Sir Robert Peel's motion. They contended that the time was altogether past for such a system existing; that we had advanced in science, and that the time had come when steamers by private enterprise should be swept away, just as stage-coaches were superseded in former days: but there was this difference in the two cases, that stage-coaches travelled by a different route, while railway companies proposed to travel by the same. He thought it impossible that any gentleman could look upon this as other than a great public question, as well as a private one, and he hoped the Council would unanimously support his Lordship in the proposition which he had made.

After a pause,—

The Lord Provost asked whether the motion was adopted.

Mr. Lumsden said he did not stand up to defend railways; but his Lordship had stated circumstances of possible occurrence, which he thought it scarcely necessary for the Council to take into account at that time, because it was possible these circumstances might never arise. He did not mean to move any amendment, but wished merely to enter his dissent.

Bailie Gray sympathised with the remark made by Mr. Lumsden. The possibility of the Edinburgh and Glasgow Railway Company seeking to obtain steamboat communication at Renfrew had been adverted to, but, granting that they did obtain it, he did not see that any harm would ensue, although a public benefit might be the result.

Bailie Blackie thought the objection to railway companies obtaining the power sought for was not founded upon any reference to local questions, but upon the great and broad principle that it would be an exceedingly dangerous thing to have the steamboat communication over the kingdom in the hands of these companies. If the principle were conceded, the continental communication, as well as the communication with Ireland and elsewhere, would be given into the hands of railway companies, and the community would be placed at their mercy, while now a healthy competition was kept up. If it was right to oppose the amalgamation of railways at home, as was done by the Council, it was far more important that they should take steps to oppose the railways in the present case.

Mr. Allan thought the Council were indebted to the Lord Provost for having brought this matter before them; and he was glad to see that they were all but unanimous in supporting the motion which had been made.

The Lord Provost said he might remark that he did not look with such alarm as seemed to be supposed upon the possibility of other companies coming forward and asking similar powers; but the thin end of the wedge was proposed to be inserted, and it would naturally be driven farther home, if possible, in every succeeding Session of Parliament. He supposed the motion to be carried, with the dissent of Mr. Lumsden, and, perhaps, he should also say, Bailie Gray.

Bailie Gray.—Decidedly.

The motion was then agreed to; and the Lord Provost was authorised to sign the petition.

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V.

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REPORT

FROM THE

SELECT COMMITTEE APPOINTED TO JOIN WITH A COMMITTEE OF THE HOUSE OF LORDS

ON

RAILWAY SCHEMES (METROPOLIS);

TOGETHER WITH THE

PROCEEDINGS OF THE COMMITTEE,

MINUTES OF EVIDENCE,

AND

AN APPENDIX.

Ordered, by The House of Commons, *to be Printed,*
29 *February* 1864.

Lunæ, 8° *die Februarii*, 1864.

Ordered, That a Select Committee be appointed, to join with a Committee of the Lords to consider the best method of dealing with the Railway Schemes proposed to be sanctioned within the limits of the Metropolis by Bills to be introduced in the present Session, and to report their opinion whether any, and if any, what Schemes should not be proceeded with during the present Session.

Committee nominated—

Mr. Milner Gibson.	Col. Wilson Patten,
Lord Stanley.	Mr. Herbert.
Mr. Massey.	

Ordered, That the Committee have power to send for Persons, Papers, and Records.

Ordered, That Three be the Quorum of the Committee.

Veneris, 12° *die Februarii*, 1864.

Ordered, That the Committee appointed by this House, to join with the Select Committee of the Lords to consider the best method of dealing with the Railway Schemes proposed to be sanctioned within the limits of the Metropolis by Bills to be introduced in the present Session, and to report their opinion whether any, and if any, what Schemes should not be proceeded with during the present Session, do meet the Lords Committee in the Painted Chamber on Monday next, at half-past Three of the clock.

Ordered, That the Select Committee appointed, to join with the Select Committee appointed by the Lords to consider the best method of dealing with the Railway Schemes proposed to be sanctioned within the limits of the Metropolis by Bills to be introduced in the present Session, and to report their opinion whether any, and if any, what Schemes should not be proceeded with during the present Session, have power to agree in the appointment of a Chairman of such Joint Committee.

Veneris, 19° *die Februarii*, 1864.

Ordered, That the Petition deposited in the Private Bill Office on the 18th day of this instant February, from the Promoters of the North and South London (High Level) Junction Railway Bill, be referred to the Select Committee on Railway Schemes (Metropolis).

Lunæ, 29° *die Februarii*, 1864.

Power to the Select Committee appointed to join with a Committee of the Lords, to report Proceedings, Observations, and Minutes of Evidence.

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BRENT RESERVOIR
MIDLAND (EXTENSION TO LONDON)
EDGWARE ROAD
GREAT NORTHERN RAILWAYS
VICTORIA SECTION
LONDON UNION RAILWAYS
HIGHGATE
HAMPSTEAD
CEMETERY
UPPER
AND HAMPSTEAD
HOLLOWAY ROAD
TOTTENHAM
METROPOLITAN
NORTHERN RAILWAY
FINCHLEY ROAD
Finchley Rd Station
Station
KENTISH TOWN
MIDLAND KENTISH EXTN
HAMPSTEAD JUNCTION RAILWAY
HAMPSTEAD ROAD
HAVERSTOCK HILL
CATTLE MARKET
CALEDONIAN ROAD
Edgware Road Station
KILBURN
HAMPSTEAD
Camden Town Station
L & N W RAILWAY DEPOT
CAMDEN TOWN
GOODS DEPOT
Willesden Station
Kilburn Station
ABBEY ROAD
PRIMROSE HILL PARK
METROPOLITAN & ST JOHNS WOOD
HAMPSTEAD METROPOLITAN & WESTERN & CHARING CROSS
HAMPSTEAD (EXTN TO) CHARING CROSS & GREAT NORTHERN RAILWAY
KINGS CROSS STATION
PENTONVILLE Station
LONDON & NORTH WESTERN RAILWAY
KENSAL GREEN
HARROW ROAD
Grand Junction Canal
Station
NORTH & SO WESTERN JN R
GREAT WESTERN RAILWAY
WORMWOOD SCRUBS
WEST LONDON RAILWAY
LONDON & CITY JN
PADDINGTON
WESTERN
GRAND JUNCTION ROAD
REGENTS PARK
EUSTON SQ STN
NEW ROAD
METROPOLITAN
BAKER ST
PORTLAND PLACE
RUSSELL SQ
BRITISH MUSEUM
CAVENDISH SQ
HYDE PARK SQ
PORTMAN SQ
OXFORD STREET AND CHARING CROSS
NATIONAL GALLERY
LONDON & SOUTH WESTERN RAILWAY
WESTBOURNE GROVE
QUEENS ROAD
KENSINGTON PARK RD
METROPOLITAN
NOTTING HILL BROMPTON
KENSINGTON GARDENS
HYDE PARK
BERKELEY SQ
PICCADILLY
ST JAMES'S SQ
PALL MALL
CREEN PARK
ST JAMES'S PARK
BIRD CAGE WALK
Westminster Bridge
Parliament Houses
UXBRIDGE ROAD
SHEPHERDS BUSH
Station
HOLLAND PARK
ADDISON ROAD
LORD HOLLANDS PARK
HOLLAND ROAD
SHEPHERDS BUSH ROAD
HAMMERSMITH RAILWAY
HAMMERSMITH
HAMMERSMITH ROAD
KENSINGTON
EXHIBITION ROAD
ALBERT RD
R.H. GARDENS
Princes Gardens SOUTH KENSINGTON MUSEUM
CROMWELL ROAD
BELGRAVE SQ
SLOANE STREET
KENSINGTON STATION & WESTERN JUNCTION
METROPOLITAN DISTRICT RY
METROPOLITAN GRAND UNION
VICTORIA STATION
VICTORIA STATION & PIMLICO RY
CHARING CROSS WESTERN RAILWAY
VINCENT SQ
VAUXHALL BRIDGE ROAD
Vauxhall Bridge
UNION
Fine Elms
Station
CHARING CROSS
WESTERN DISTRICT
BROMPTON ROAD
NEW BROMPTON
OLD BROMPTON ROAD
CHELSEA HOSPITAL
KINGS ROAD
WALHAM GREEN
LONDON UNION RYS EXTENSION RAILWAY
Hammersmith Bridge
Battersea Park Bridge
Battersea or Chelsea Bridge
BARNES
PALACE
FULHAM ROAD
BATTERSEA PARK
LONDON & SOUTH WESTERN RAILWAY
L.C. & D. RY
WANDSWORTH ROAD
STOCKWELL
From Richmond
Barnes Stn
Putney Bridge
LONDON & PUTNEY
RICHMOND ROAD
SOUTH WESTERN RAILWAY
WANDSWORTH
Station
Clapham Junction
BATTERSEA RISE
CLAPHAM
LONDON
LONDON C.& D. (NEW LINES No 2)
ACRE LANE
CLAPHAM COMMON
CLAPHAM PARK
CLARENCE ROAD
KINGS ROAD
ROEHAMPTON
L & S W RY
CRYSTAL PALACE LINE
L.B. & S.C.
SOUTH LAMBETH
STOCKWELL
OVAL
PENTMAN ROAD

SESSION 1864.

Metropolitan Railway Schemes.

MAP

TO ACCOMPANY JOINT REPORT OF THE SELECT COMMITTEE of the Two Houses of Parliament.

Reference.

- Railways open
- D.o sanctioned but not open
- Schemes to proceed in ordinary course
- D.o to be postponed
- D.o to proceed Sub modo

NOTE

- Tunnels are shewn by dotted lines
- Lines partly covered
- The Metropolitan Boundary

HIGHGATE & LONDON RAILWAY
DISTRICT RAILWAY
GREAT EASTERN (METR.ST.N)
CITY & SOUTH LONDON (METROPOLITAN ST.N)
GREAT EASTERN RAILWAY
From Cambridge
Lea Bridge Station
UPPER STAMFORD HILL
STOKE NEWINGTON
HIGHBURY
KINGSLAND
HACKNEY
HOMERTON
CLAPTON
STAMFORD HILL
Seven Sisters Stn
Stoke Newington Road
Kingsland & Tottenham (Metr.St.N)
Clapton
Walthamstow & North London (Metr.St.N)
Station
To Colchester
CT E. RY
STRATFORD
VICTORIA PARK
WEST HAM
TOTTENHAM AND FARRINGDON STREET
LONDON RAILWAY
NORTH LONDON CITY EXTN
Regents Canal
HACKNEY ROAD
CITY ROAD
OLD STREET
GREAT EASTERN RAILWAY
BOW Station
STRATFORD ROAD
SOUTHEND RAILWAY (BARKING BRANCH)
LONDON TILBURY
BETHNAL GREEN
SHOREDITCH STATION
C.E. Jn
Ct En (Met.St.N)
FARRINGDON STATION
FINSBURY SQUARE
METROPOLITAN GRAND UNION
SMITHFIELD
LONDON MAIN TRUNK UNDERGROUND
STEPNEY
LONDON & BLACKWALL EXTN RY
NORTH LONDON RAILWAY
Barking Station
NEWGATE ST
G.P.O.
CHEAPSIDE
LEADENHALL
FENCHURCH ST
TEMPLE
COMMERCIAL ROAD
Station
LONDON & BLACKWALL RY
LONDON DOCK BRANCH
L.M.T.U.
EAST LONDON
POPLAR
EAST INDIA DOCKS
E.I.D.
BLACKWALL STATION
VICTORIA DOCKS
Southwark Bridge
London Bridge
LONDON DOCKS
METROPOLITAN (TOWER TO FINSBURY SQUARE)
THAMES ST
CROSS RAILWAY
LONDON BRIDGE STATION
Thames Tunnel
METROPOLITAN DISTRICT
WEST INDIA DOCKS
ISLE OF DOGS
BLACKWALL EXTENSIONS
METROPOLITAN GRAND UNION
ROTHERHITHE
NEW KENT ROAD
BRICKLAYERS ARMS STATION
SOUTH EASTERN
LONDON CHATHAM & DOVER RAILWAY
Surrey Canal
KENT ROAD
E.B.&S.C.
DEPTFORD
Deptford Stn
Station
To Woolwich
GREENWICH
GREENWICH PARK
DOVER ROAD
BLACKHEATH
Lewisham Station
Blackheath Station
NORTH KENT
LONDON BRIGHTON & SOUTH COAST
CRYSTAL PLACE
TELEGRAPH HILL
NUNHEAD CEMETERY
LONDON BRIGHTON & SOUTH COAST
SOUTH EASTERN & CHATHAM & DOVER
LONDON CHATHAM & DOVER
DEPTFORD COMMON
MID KENT RY
SOUTH EASTERN & TUNBRIDGE WELLS
LEE
CAMBERWELL
PECKHAM
HERNE HILL
HALF MOON LANE
OAK OF HONOR HILL
BROCKLEY

REPORT.

THE SELECT COMMITTEE appointed to join with a Committee of the Lords to consider the best method of dealing with the RAILWAY SCHEMES proposed to be sanctioned within the limits of the METROPOLIS, by Bills to be introduced in the present Session, and to Report their Opinion whether any, and if any, what Schemes should not be proceeded with during the present Session :—

ORDERED TO REPORT,

THAT the Committees have met, and, having jointly considered the matters referred to them, and taken the Evidence of such of the Agents or Engineers of the several Schemes as it appeared to them material to examine, have agreed to the following REPORT, viz.:

The Railway schemes that have been referred for the consideration of the Joint Committee are of extraordinary magnitude for so limited an area as the Metropolitan Railway district, extending over a length of 174 miles in the aggregate, involving the raising of a capital of nearly 33,000,000 *l.* in shares, and 11,000,000 *l.* by loan, creating alarm amongst the holders of a vast amount of property, and interfering, during the construction of the proposed works, with many important public thoroughfares.

They include the construction of no less than four new Railway Bridges across the Thames; two of them of gigantic size, below London Bridge.

It is stated by the surveyor to the Commissioners of Sewers of the City of London that the lands and buildings scheduled in the City of London for the proposed Railway schemes comprise about one-fourth of the entire area of the City.

The Committee are of opinion that the following Bills, or parts of Bills, should not be proceeded with during the present Session :

Victoria Station and Thames Embankment.
Oxford-street and City.
London Main Trunk Underground.
Metropolitan Grand Union, the portion south of Thames-street.
Charing Cross (Northern).
Charing Cross (Western).
Tottenham and Hampstead Junction (Extension to Charing Cross).
London Union.
Metropolitan District, the portion forming the Outer Circuit.
Tottenham and Farringdon-street.

The Committee recommend that the fees which have been incurred in respect of the said Bills should be remitted.

The two first-named of these lines are proposed to be worked on the pneumatic principle—a principle hitherto untried, as applied to railway passenger carriages,

and it seems undesirable that the experiment should first be made in an important Metropolitan thoroughfare. They are passenger railways, and are intended to relieve the streets of omnibus and cab traffic. The necessity for any such lines would be to some extent lessened supposing the Railways forming the Inner Circuit scheme, referred to in a subsequent part of this Report, to be sanctioned.

The London Main Trunk Underground proposes to provide a more central Station for the Great Eastern, an object which is also sought to be accomplished by the Great Eastern Company itself by the Great Eastern (Metropolitan Station and Railways) Bill. The Select Committee of the House of Lords on Metropolitan Railway Communication of last Session recommended that the Great Eastern should be allowed to establish a more central Station than it has at present.

The portion of the Metropolitan Grand Union south of Thames-street, which the Committee recommend should not be proceeded with, involves a high-level bridge over the river below London Bridge. The communication between the Railways north and south of the river at that end of the Metropolis might, it appears to the Committee, be better effected by the East London Railway through the Thames Tunnel, and the proposed abandonment is approved by the promoters, and the Committee recommend that they should be allowed to amend their estimate, and be permitted to withdraw a portion of their deposit.

Three schemes in this list, the Charing Cross (Western), the London Union, and the portions of the Metropolitan District Railways, proposed to be postponed, in addition to other objections require the construction of bridges across the Thames; one of them being a high-level bridge below London Bridge.

Two of the schemes, viz., the Charing Cross (Northern), and the Tottenham and Hampstead Junction (Extension to Charing Cross), which are designed to be more or less connected with the Northern Lines, and which pass through the centre of the Metropolis to the Charing Cross Station, are open to the objection that they tend to create a great Central Station at Charing Cross.

The Tottenham and Farringdon-street Railway, by which it is proposed to connect the Cambridge line of the Great Eastern Railway with the Station at Farringdon-street, is open to the same objection urged against the Charing Cross (Northern), and the Tottenham and Hampstead Junction (Extension to Charing Cross), that it tends to create a great central Station, inasmuch as the Great Northern, the Midland, and the London, Chatham, and Dover Railways, are already brought in direct Station communication with the Metropolitan Railway at Farringdon-street. As the Great Eastern Railway has another scheme for an improved Station which the Committee recommend should proceed, it appears desirable that this Bill should be postponed, at all events, until it can be known by experience whether any inconvenient amount of traffic will be concentrated at Farringdon-street by the lines already allowed to meet there.

As to all the schemes above referred to, the Committee would observe, that in recommending their postponement, they have been strongly influenced by the consideration of the great public inconvenience and pecuniary loss to the inhabitants of the district that must unavoidably be caused by the interruption of thoroughfares during the construction of works of this nature; and as the schemes which the Committee (concurring generally in the views of the Lords' Committee of last Session) recommend to be proceeded with are of very great magnitude and extent, they have thought that any schemes which did not appear to be of more than ordinary urgency might properly be postponed for future consideration.

Without expressing any opinion as to the merits of the following Bills, the Committee recommend that they should be proceeded with in the ordinary course, being only improvements of existing lines or works; connecting links of a very limited extent, or enlargements of existing stations in no way conflicting with any comprehensive system of Metropolitan Railway; viz.:

Great Northern and Victoria Station.
London and Blackwall (Extension).
London, Brighton, and South Coast (New Line in Battersea).

Great

Great Northern, No. 1 (Barnet Branch).
London and North Western (Additional Powers).
London and South Western (Additional Works).
London, Brighton, and South Coast (Additional Powers).
North London (Additional Powers).
London, Chatham, and Dover, No. 1.
London, Chatham, and Dover, No. 2.
Great Eastern (Junctions), except Junction No. 8.
Midland (St. Pancras Branch).
Metropolitan (Additional Powers).

The Committee also recommend that the Metropolitan and St. John's Wood should be allowed to proceed, as it is a line which passes through a not very populous but increasing district, without interfering with much property, and in no way competing with any other scheme. The Committee must, however, remark that it is proposed to be constructed as a single line only.

The Committee also recommend that the Hampstead, Midland, North-Western and Charing Cross Junction should be allowed to proceed. This scheme is in some degree open to an objection already referred to, that it tends to create a central Station at Charing Cross. It, however, proposes, in addition to the Railway (which is to be constructed wholly in tunnel), to form three new streets, one of them of a very important character, in continuation of Tottenham-court-road from Oxford-street, in a direct line to St. Martin's-lane, near Aldridge's Repository, and from thence to the Thames Embankment, near the Charing Cross Railway Station.

This new line of thoroughfare, which would be a substitute for the present objectionable route through Seven Dials and High-street, St. Giles's, would be a great public improvement. The Engineer of the Metropolitan Board of Works, and the Streets Committee of the same Board, have both reported in this sense. The combination of new streets in crowded parts of the Metropolis with the construction of Railways was recommended in the Report of the Lords' Committee last Session, and is an improvement on the metropolitan communication in which the Committee desires to express their complete concurrence.

The Committee are of opinion that if the Select Committee to which the Bill for this scheme may be referred should see fit to sanction the scheme, they should do so only on the condition that the new streets above referred to should be constructed contemporaneously with the Railway, and that provision should be made in the Bill for ensuring their completion.

The Committee concur in the opinion expressed by the Select Committee of the House of Lords on Metropolitan Railway Communication of last Session, in their Third Report, that with a view to the distribution of the passenger traffic arriving by the main lines of railway coming within the Metropolis, and also to relieving the crowded streets by the absorption of a large portion of the omnibus and cab traffic, the completion of an Inner Circuit of railway is desirable. It was established by evidence before the Committee that great additional accommodation, especially for the labouring classes, is daily becoming more necessary, while there is no prospect of the present ordinary means of conveyance being at all adequate to future wants; and they are of opinion that the following schemes, which contribute towards the formation of such a circuit, may properly be proceeded with:

Metropolitan District Railways (the portion forming the Inner Circuit, Nos. 32, 33, 34; and Junctions 7, 8, 9.)
Metropolitan Railway (Trinity-square Extension).
Metropolitan Railway (Notting Hill and Brompton Extension).
Metropolitan Grand Union Railway (the portion North of the Thames).

The Committee are also of opinion that the following schemes, viz., the

East London,
Great Eastern (Metropolitan Station and Railways),

Great Eastern (Junctions), (Junction No. 8),
North London (Kingsland and Tottenham Line),
Walthamstow, Clapton and City,

may properly be proceeded with; and as these schemes more or less enter into connexion with, or compete, or conflict in levels with the schemes above referred to as designed to form the Inner Circuit, and with each other, the Committee are of opinion that all the above schemes may with advantage be grouped together, and be referred to the same Select Committee.

In making this recommendation, the Committee are of opinion that the greatest accommodation to the public will not be secured by treating the two schemes which pursue almost the same line from Kensington and Brompton to the City merely as competing schemes, one of which is to be preferred to the exclusion of the other. The Committee are of opinion that the promoters of these schemes should communicate together, and with the surveyors of the City and Metropolitan Board, and devise the most perfect line which their several plans will admit of. By a relaxation of the Standing Orders, this revised plan might be embodied in one Bill. By such a course much useless expenditure would be saved, and the interests of the Metropolis far better secured than by taking the chance of the selection of one among the competing lines. The Metropolitan Railway (Trinity-square Extension), and the western branches of the East London Railway, should also be brought into this proposed consolidation.

The Committee observe with regret, that two of the schemes which they have recommended should be allowed to proceed propose to pass through Finsbury Circus in open cutting. They are however informed, that the promoters of both are willing to substitute a covered way for the open cutting. In the event of the Select Committee finding it desirable to adopt either of these lines, in preference to those which do not interfere with the Circus, the Committee recommend that effectual provision should be made, by which the time to elapse between the breaking up of any part of the garden, and the completion of the works there, and the proper restoration of the enclosure should be as short as possible.

Although the Committee have recommended that those portions of the Metropolitan District Railways scheme which are designed to form the Outer Circuit should not be proceeded with, they concur with the House of Lords Committee of last Session in thinking an Outer Circuit desirable, and they are of opinion that this object might be accomplished by uniting the existing Railways on the Eastern side of the Metropolis with one another, and connecting those of them which are situate on the North side of the Thames with the Railways on the South side, making use for this purpose of the Thames Tunnel.

For this purpose it would be necessary for the East London to be in connexion with the North London, the Great Eastern, and the London and Blackwall Railways. This combination, taken in connexion with the existing lines on the west and south of the Metropolis, as suggested by the Secretary of the London and North Western Railway Company in his evidence before the Committee, would complete an Outer Circuit; but it would be further necessary that an interchange of facilities, on equal terms, between all necessary parties interested should be secured by legislative enactment.

In order to give the public the full advantage of a system of intercommunication, such as that which has been suggested, it would be desirable that the Select Committee to whom the Metropolitan Schemes in question may be referred, should require that such modifications should be made in the schemes which may be sanctioned as may be necessary for effecting the proposed combinations; and also that a clause should be inserted in the Bills of all Railway Companies having termini within the Metropolitan district, for securing a mutual interchange of facilities for working the traffic upon the Railways in that district on equitable terms among themselves, and without any undue preference; the terms to be settled, in case of difference, by the Board of Trade, or an arbitrator to be appointed by that department. A clause should also, they think, be inserted in each of the Bills, providing that Railways having termini within the Metropolis should be subject to the provisions of any Act to be passed in the present or any future Session, for the regulation of Railways within the Metropolis.

The

The Committee are of opinion that some of the provisions of the Railway Clauses Consolidation Act, 1845, require revision in relation to metropolitan arrangements, and they recommend the introduction of a Bill for that purpose. They desire also to direct attention to a suggestion in Colonel Yolland's Report to the Board of Trade as to the expediency of requiring all plans for Railways within the Metropolitan Railway district being drawn to the same datum line.

The Committee are of opinion that in the present Session such of the Bills proposing to sanction Railway communication within the limits of the Metropolis as are to be proceeded with should commence in the House of Commons.

A map accompanies this Report, in which the existing Railways are shown by a strong black line, and Railways sanctioned but not constructed are shown by a slight black line (the lines being dotted for underground Railways), and the proposed new schemes are shown in like manner by coloured lines. The schemes recommended to be at once allowed to proceed in the ordinary course are coloured yellow; the schemes or parts of schemes proposed to be postponed are coloured green, and the remainder are coloured red. The boundary of the Metropolitan Railway District, as proposed by the Lords' Committee of last Session, is shown by a red shaded line.

And the Committee have directed the MINUTES OF EVIDENCE taken before them, together with an Appendix, to be reported.

29*th February* 1864.

PROCEEDINGS OF THE COMMITTEE.

Lunæ, 15° *die Februarii*, 1864.

LORDS AND MEMBERS PRESENT:

The Lord President.	Mr. Milner Gibson.
The Earl of Romney.	Lord Stanley.
Viscount Eversley.	Mr. Massey.
Lord Redesdale.	Colonel Wilson Patten.
Lord Stanley of Alderley.	Mr. Herbert.

Order of The House, That the Select Committee have power to agree in the appointment of a Chairman, read.

The LORD PRESIDENT was called to the Chair.

The Order of Reference was read.

The Committee deliberated on the course of proceeding.

[Adjourned to To-morrow, at One o'clock.

Martis, 16° *die Februarii*, 1864.

PRESENT:

The LORD PRESIDENT in the Chair.

Earl of Romney.	Mr. Milner Gibson.
Lord Redesdale.	Lord Stanley.
Lord Stanley of Alderley.	Mr. Massey.
	Colonel Wilson Patten.
	Mr. Herbert.

Lieut.-Colonel *Yolland* and Mr. *James Booth* were examined.

[Adjourned to To-morrow, at Twelve o'clock.

Mercurii, 17° *die Februarii*, 1864.

PRESENT:

The LORD PRESIDENT in the Chair.

Earl of Romney.	Mr. Milner Gibson.
Viscount Eversley.	Lord Stanley.
Lord Redesdale.	Mr. Massey.
Lord Stanley of Alderley.	Colonel Wilson Patten.
	Mr. Herbert.

Mr. *G. P. Bidder*, Mr. *C. E. Stewart*, Mr. *James Forbes*, and Lieut.-Colonel *Yolland*, were severally examined.

[Adjourned to To-morrow, at Twelve o'clock.

Jovis, 18° *die Februarii*, 1864.

PRESENT:

The LORD PRESIDENT in the Chair.

The Earl of Romney.	Mr. Milner Gibson.
Viscount Eversley.	Lord Stanley.
Lord Redesdale.	Mr. Massey.
Lord Stanley of Alderley.	Colonel Wilson Patten.
Viscount Eversley.	Mr. Herbert.

Mr. *John Fowler*, Mr. *John Hawkshaw*, Mr. *Thomas Bouch*, Mr. *William Henry Le Feuvre*, Mr. *Robinson Maclean*, Mr. *John S. Burke*, Mr. *Peter Bruff*, Mr. *Thomas Paine*, and Mr. *William Bourne Lewis*, were severally examined.

[Adjourned to To-morrow, at Twelve o'clock.

Veneris, 19° *die Februarii*, 1864.

PRESENT:

The LORD PRESIDENT in the Chair.

Earl of Romney.	Mr. Milner Gibson.
Lord Redesdale.	Lord Stanley.
Lord Stanley of Alderley.	Mr. Massey.
Viscount Eversley.	Colonel Wilson Patten.
	Mr. Herbert.

Mr. *Joseph W. Bazalgette*, Mr. *William Haywood*, Mr. *Thomas W. Rammell*, Mr. *James Brunlees*, and Mr. *Thomas Marr Johnson*, were severally examined.

[Adjourned to Thursday next, at Twelve o'clock.

Jovis, 25° *die Februarii*, 1864.

PRESENT:

The LORD PRESIDENT in the Chair.

The Earl of Romney.	Mr. Milner Gibson.
Viscount Eversley.	Lord Stanley.
Lord Redesdale.	Mr. Massey.
Lord Stanley of Alderley.	Colonel Wilson Patten.
	Mr. Herbert.

Draft Report read, and considered; and several Amendments were made therein.

Motion made, and Question put, "That the Hampstead, Midland, North Western, and Charing Cross Junction Railway be allowed to proceed, upon condition that the new street be made."—(Moved by the Earl of *Romney*).

The Committee divided:—

Contents and Ayes, 6.	Non-Contents and Noes, 4.
The Lord President.	Lord Redesdale.
Earl of Romney.	Lord Stanley of Alderley.
Viscount Eversley.	Mr. Milner Gibson.
Lord Stanley.	Colonel Wilson Patten.
Mr. Massey.	
Mr. Herbert.	

[Adjourned to Monday next, at Two o'clock.

Lunæ, 29° die Februarii, 1864.

PRESENT:

The LORD PRESIDENT in the Chair.

The Earl of Romney.	Mr. Milner Gibson.
Lord Stanley of Alderley.	Lord Stanley.
	Mr. Massey.
	Mr. Herbert.

Draft Report again considered, and further Amendments made.

Report, as amended, agreed to.

Ordered, To report the same, together with the Minutes of Evidence and Appendix.

Ordered, That Mr. Milner Gibson be instructed to make the said Report to the House of Commons.

To Report.

MINUTES OF EVIDENCE.

LIST OF WITNESSES.

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Charles Edward Stewart, Esq. - - - - - p. 21
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Die Jovis, 18° *Februarii,* 1864.

John Fowler, Esq. - - - - - - - p. 33
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Die Martis, 16° *Februarii* 1864.

PRESENT:

Lord President.	Mr. Massey.
Earl of Romney.	Colonel Wilson Patten.
Lord Redesdale.	Lord Stanley.
Lord Stanley of Alderley.	Mr. Herbert.
Mr. Milner Gibson.	

The LORD PRESIDENT, in the Chair.

JAMES BOOTH, Esquire, and LIEUTENANT-COLONEL YOLLAND, are called in, and examined.

1. *Chairman* (To Mr. *Booth*).] YOU are one of the Joint Secretaries to the Board of Trade?
Yes.

2. (To Colonel *Yolland.*) You are one of the Inspectors of the Railway Department of the Board of Trade?
I am.

3. (To Mr. *Booth.*) Have you made any classification of the railways coming under our consideration?
I have.

4. Will you state to the Committee generally the classes into which you have divided them?
It occurred to me that the Committee might perhaps, in the first instance, take into consideration whether they could set free any of the schemes at present tied up under the order of the House.

5. What are the schemes which you suggest could be set free?
I think that the following might be set free, as being schemes which are designed as improvements of existing lines by rendering curves and inclines less dangerous, and bringing the lines into better connexion one with another, and which do not conflict with any supposable comprehensive system of metropolitan railways.

6. Will you state which of the Bills come under that description?
One is the Great Northern and Victoria Station. That does not come within the limits of the Metropolitan District, except at a very small angle near the point where it joins the West London.

7. Lord *Stanley* of Alderley.] The only new works which the Great Northern and Victoria Station Company propose to make are from the junction at Barnet to the junction with the West London Railway at Wormwood Scrubs.
(Colonel *Yolland.*) The Great Northern and Victoria Station stops at the West London Railway at Willesden.

8. *Chairman* (To Mr. *Booth*).] Which is the next Railway that you would put in the same class?

James Booth, Esq. and *Lieutenant-Colonel Yolland.*

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The next is the London and Blackwall Extensions. It affords Railway communication to the Isle of Dogs; it interferes with no other schemes; it makes one or two small junctions, and widens part of the main line, and enlarges the Fenchurch-street Terminus.

9. Which is the next Railway that you would put in the same class?
The London, Brighton, and South Coast (New Lines in Battersea). This is almost entirely beyond the limits, and where it is within them, it seems to be generally through open ground.

10. Which is the next Railway?
The Great Northern No. 1 (Barnet Branch). It takes land for station purposes, and to make a very short extension near King's Cross. It also takes power to run over several lines.
(Colonel *Yolland.*) It is for the extension of their coal-yard.

11. *Chairman.*] What is the next railway coming under the same class?
The London and North Western (Additional Powers), proposes some further junctions near Willesden, hardly within the limits; it also proposes a carriage road from Drummond-street, across the northern section of Euston-square.

12. Lord *Redesdale.*] Does it pull down any houses?
No.

13. Lord *Stanley* of Alderley.] There is additional land near Liverpool-street also proposed to be taken; how much land is proposed to be taken there?
About two acres.

14. Lord *Redesdale.*] Is that ground proposed to be taken by any other Company?
No. (Colonel *Yolland.*) Some of the proposed schemes would pass under it.

15. Do they propose to take the whole of Long-alley?
The whole of that block of buildings.

16. They stop up Long-alley altogether?
Yes.

17. They propose to take an arch over Crown-street?
Yes.

18. Lord *Stanley* of Alderley.] Last year was not it suggested that the Great Eastern might avail themselves of a portion of the Liverpool-street ground for the purpose of making a station themselves?
Yes.
(Mr. *Booth.*) The Great Eastern do not now propose to do so.

19. *Chairman* (To Mr. *Booth*).] Which is the next Railway that you would put in the same class?
The London and South Western (Additional Works); that proposes some new junctions almost entirely beyond the limits,

20. Lord *Stanley.*] The whole of the new part of that line is to the south and west of Battersea Park?
(Colonel *Yolland.*) Yes; to the south and west of Battersea Park.

21. *Chairman* (To Mr. *Booth*).] Which is the next?
The London, Brighton and South Coast (Additional Powers); that forms a junction with the London, Chatham and Dover, coming slightly within the limits at Peckham, apparently on open ground. It widens a short piece of the line at Brixton, and takes some additional land for the Bricklayers' Arms Station.

22. Lord *Stanley* of Alderley.] It goes right across Clapham Common, does not it?
(Colonel *Yolland.*) Yes it does. That is outside the limits of the Metropolitan Railway District. It belongs to the new lines at Battersea.

23. *Chairman* (To Mr. *Booth*).] Which is the next Railway?
The North London (Additional Powers). That proposes to construct a new dock

dock at Poplar. It widens a bridge at Poplar, and stops up one or two unimportant streets at Hackney. That is within the limits.

24. Which is the next?

The London, Chatham and Dover (No. 1). That proposes no new works, but constitutes a portion of their authorised Metropolitan Extension lines north of Earl-street as a separate undertaking, with a new capital. This is the account of the Bill which we give in our report upon the Bill: "This Bill proposes to constitute, as a separate undertaking, to be called 'The City Lines Undertaking' of the London, Chatham and Dover Railway Company, so much of the Railway to the north of Earl-street, Blackfriars (authorised in 1860 as part of the 'City Section' of the 'Metropolitan Extensions') as the Company by their London, Chatham and Dover Railway, No. 2 (New Lines) Bill of this Session may not be authorised to abandon, together with any Railway, to the north of Earl-street, which may be authorised by that Bill. For this separate undertaking, the London, Chatham and Dover Company are to have a 'City Lines Capital' of 1,000,000 *l.* in new shares or stock, and power to borrow 333,300 *l.*, to which capital the Great Northern Railway Company are to be required to contribute 300,000 *l.*, such contribution being entitled to a dividend of 1 *l.* 15 *s.* half-yearly, to be recoverable, in case of deficiency in the profit of the 'City Lines,' by distress and entry on any other undertaking of the London, Chatham and Dover Railway Company."

25. Do you not see some advantage in retaining that Bill to be considered with the inner circle group, with the view of some possible amalgamation or arrangement being made with some other lines?

That may be the case. I do not know that it would be necessary to add it to the group; but it might be convenient to defer the consideration of this Bill till it is seen what is to be done with the inner circuit group.

26. Which is the next Bill?

The London, Chatham and Dover (No. 2) would go with No. 1. Then the next is the Great Eastern (Railway Junctions). All the junctions but one are in country districts. The one, 20 chains only, is to make a connexion with land of the Company; it is in part on a viaduct. That part of the Bill could not be considered till it has been decided what is to be done with the East London, a portion of which is on a conflicting level. It seems desirable, therefore, that if the Bill is set free, the consideration of that small portion should be deferred. Those are all the Bills which I place in that class.

27. Will you favour the Committee with your suggestions as to any other Bills?

There are two very small schemes, the Midland (St. Pancras Branch) and the Metropolitan (Additional Powers), which might, perhaps, be deferred till it was seen how the connected schemes in the inner circuit group are to be dealt with. The Midland is a short branch, very much in the same line as their authorised branch, but at a lower level, so as to form a junction with the the Metropolitan Additional Powers Branch. The other, the Metropolitan, is the converse.

28. Lord *Redesdale.*] The object of those two lines is, I presume, to effect a junction between the Midland and the Metropolitan Railway?

Yes.

29. And the whole is almost without exception upon the properties or under the properties of the two Companies?

(Colonel *Yolland.*) Mainly so.

30. (To Mr. *Booth.*) What is the object of the Victoria Station, and Thames Embankment Bill?

It appears to be an omnibus line, and though running parallel with a portion of the inner circuit (through the Thames Embankment) it is not connected with it, and is constructed upon a principle different from the other lines running through the Embankment.

31. (To Colonel *Yolland.*) Where does it commence, and where does it terminate?

It commences at the Victoria Station and ends at Blackfriars Bridge.

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32. Is it entirely an underground line?
Entirely; it is a tube, to be worked on the pneumatic principle, though the Promoters do not bind themselves to work it upon that principle.

33. Lord *Stanley* of Alderley.] It is not obligatory upon the Company to work upon the pneumatic principle?
It might be worked by a different class of locomotives from those now in use on railways, but the size of the tube is essentially different from any tunnels hitherto constructed for passenger trains; it is a 10½ feet in height tube.

34. Lord *Redesdale.*] It could not be constructed under the present estimate, in any other way than by a pneumatic tube?
I imagine the estimate is only for a small tube.

35. Would not a tube or tunnel only 10 feet 6 be totally inadequate for an ordinary locomotive?
No doubt.

36. That being the case, would not the construction of that line, so as to admit of the use of locomotives, cost a great deal more money than is proposed to be expended on the pneumatic tube?
Certainly. I do not know whether they have taken a sufficient estimate for an ordinary railway tunnel.

37. Lord *Stanley* of Alderley.] Do I understand you rightly that this Company only propose to work the line on the pneumatic principle, and that it will not be open to them to adopt any other principle of locomotion?
They will not bind themselves to work on the pneumatic principle; that is, to depend upon the success of an experiment to be tried at the Crystal Palace in April or May next.

38. It is not necessarily to be worked upon the pneumatic principle, but it may be worked upon the pneumatic principle, if that is found to be successful, or by the ordinary locomotives, or by other means?
Not by ordinary locomotive engines, because the ordinary locomotives could not go through the tunnel of the dimensions proposed.

39. Colonel *Wilson Patten.*] In what other way could it be worked?
It could be worked by a smaller locomotive than those at present in use, but the ordinary locomotives could not enter the tunnel.

40. *Chairman.*] The locomotives and carriages would require to be of a different construction from those now in ordinary use?
The ordinary carriages might be used, but they would be very objectionable; the difficulty would arise with the ordinary locomotives.

41. Lord *Stanley.*] Could it be worked by a stationary engine?
No; it is not a case where a stationary engine would be available, except on the pneumatic principle.

42. Colonel *Wilson Patten.*] It is to be underground the whole way?
Yes; under Victoria-street and under the Embankment the whole way; it must be a closed tube for the interval between two stations.

43. Lord *Stanley* of Alderley.] Is it proposed to be parallel and on the same level with the sewer?
Very nearly.

44. Colonel *Wilson Patten.*] Is there anything in the site that requires a tunnel of such small dimensions?
Nothing whatever.

45. Lord *Redesdale.*] Does it occupy ground proposed to be taken by any other scheme?
It is close alongside two other schemes.

46. Lord *Stanley* of Alderley.] Are there two other schemes for making use of the Embankment?
Yes, two other schemes run along the Embankment of the ordinary construction, but they extend further to the east and further to the west.

47. Lord

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47. Lord *Redesdale.*] What is the object of the Oxford-street and City Line?
That is proposed to be worked on the same principle; it is proposed as an omnibus line to free Oxford-street from traffic.

48. What is the object of the Metropolitan and St. John's Wood Line?
To make an omnibus line between the Hampstead Junction and the Metropolitan Railway from the Finchley Road Station to the Baker-street Station.

49. Is that a pneumatic line?
No.

50. Is it an underground line?
It is to be covered for the greater portion of the way, inasmuch as it is under roads.

51. Is it a single line?
I understand it is to be a single line.

52. *Chairman* (To Mr. *Booth*).] What is the character of the Metropolitan District Railways outer circuit scheme?
It is a comprehensive scheme on a very large scale, encircling the Metropolis, and involving two crossings of the river, one of them by a high level bridge near Limehouse.

53. Are there any objections raised to that scheme?
The London and North Western Company strongly represented, in a deputation to the Board of Trade that that scheme is unnecessary, that the existing schemes are already almost sufficient, and that they are disposed, in conjunction with other companies, to supply anything which may be necessary to complete the system. The Board of Trade have received two letters from the Directors of the London and North Western Company, making that representation.

54. Will you have the goodness to read them? (*The Witness read the letters.*)

LONDON AND NORTH WESTERN RAILWAY.

Secretary's Office, Euston Station,
London, 13 January 1864.

Sir,

THE Directors of the London and North Western Railway Company have had under consideration the numerous schemes deposited of proposed railways in and about the metropolis.

These measures, whether viewed with reference to the magnitude of the capital proposed to be expended, to their effect upon the inhabitants of London, or to their influence, if sanctioned, upon the large amount of capital already expended by railway proprietors, demand the serious attention not only of all parties immediately interested, but of Her Majesty's Government, as representatives of the whole community.

It is of course only as the proprietors of the London and North Western Railway Company may be affected by these measures that my directors have any right to address their Lordships, but they entertain a confident belief that all established railway companies have a common interest with the public generally, that this great question should be approached by all parties in a spirit of co-operation, in place of distrust and consequent antagonism.

As yet only one short line of railway has been constructed under the streets of London, but the experience thereby obtained of the interruption to the general traffic, and of the serious inconvenience and injury to the inhabitants in the more immediate vicinity of the works while in progress, has been such that the schemes now proposed cause a deep and wide-spread feeling of alarm.

The Special Committee of the House of Lords, appointed last Session to report upon the Bills then before Parliament, have stated the conclusions at which their Lordships arrived on the evidence before them.

It will be admitted, that some further extension of railway communication in and about the metropolis is desirable in the public interest, and therefore the only question is, how the needful accommodation can be afforded most efficiently, with the smallest outlay of capital and the least interference with property and public convenience.

The House of Commons have recently investigated the present system of Private Bill legislation, with a view to changes rendered necessary by the state of antagonism and costly litigation into which the railway system of this country has been brought. Parliament and the public appear to recognise as a serious evil, the time and large amounts of money wasted annually in the contentions before Committees on Private Bills. It is beyond question that this admitted evil is now attributable, in the main, to the absence of any defined and settled principle in dealing with the vast interests created in connexion with railways, for although at one time these contests may have had their origin in an expectation, based on the apparent policy of Parliament, that monopoly might be maintained, yet, for some time past, that expectation has been very generally abandoned.

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It is no disrespect to say, and it will not be denied, that the proceedings of Parliament in dealing with this great interest have been wanting in any fixed or defined policy, and such as to compel established companies, as the lesser evil, to resist measures which, under a different condition of legislation, it would have been their interest, in common with that of the public, to encourage.

The proprietors of existing railways, as the owners of nearly 400 millions of capital, may reasonably expect that Parliament will not allow their property to be sacrificed, as is now too frequently the case, for the sole benefit of speculators, who, under the guise of public advantage, claim to use works already established at great cost, and having acquired their rights, seek only to dispose of them to the highest bidder; and further, that they will not countenance the disturbance of arrangements between railway companies, except and to such extent as may be necessary in the public interest, and then only with due regard to the equitable claims of the parties.

The London and North Western Company have expended millions in the construction of railways and works in and about London, the lines of which they are the owners or part owners, and over which they have the right to work, embracing more than two-thirds of the circle of London, extending from the north side of the Thames, and through the eastern and northern districts, to the south of the river near Battersea.

Under existing circumstances, the directors, as trustees, have little or no option but to appear in Committee on every contested Bill, by which their interests may be affected, well knowing from experience that a lodgment made by a speculative scheme in one Session is too often only the stepping-stone to a serious invasion of their property, and costly contest in a future Session.

I am instructed to submit these observations that their Lordships may be made aware of the difficulty which the directors feel in acting, as they believe it would be for the interest of their proprietors and the public that they should be able to act in connexion with the schemes in question.

If, however, some principle were adopted which, while rendering the railways in and about London available to the greatest extent practicable, would guard the proprietors against powers so given being abused, I am authorised to say that, in such event, the Directors of this Company will be prepared to recommend their proprietors to unite, with all the necessary parties interested, in the interchange of facilities on equal terms, and in such arrangements generally as may conduce most to the public convenience and to the mutual advantage of the proprietors of the different railways.

I am, &c.
Chas. E. Stewart,
Secretary.

Sir J. Emerson Tennent,
&c. &c. &c.,
Board of Trade.

London and North-Western Railway.

Secretary's Office, Euston Station,
London, 26 January 1864.

Sir,

Referring to my letter dated the 13th instant, to the address of Sir J. Emerson Tennent, and to the subsequent interview which the deputation from the Board of Directors of this Company had with the Right Hon. the President of the Board of Trade, I am instructed to transmit the accompanying map, showing, amongst others, the lines alluded to in the latter paragraphs of my letter.

In further explanation, I beg to state that the lines in question commence at Blackwall, Fenchurch-street, and Liverpool-street, from which several points they unite at Kingsland, on the North London Railway, from whence the route is continued to Willesden, by the line through the Camden Station, and also by the Hampstead Junction line, the property of this Company; from Willesden, the route proceeds over the West London, and West London Extension Lines to the south of the Thames, where junction is effected with the lines of the Brighton, the South-Western, and the London, Chatham and Dover Companies.

By arrangements and interchange of facilities with those companies, on the basis indicated in my letter of 13th instant, the route might be carried by the already sanctioned lines of the South-Western, South-Eastern, and South London line of the Brighton Company to a point on the south side of the Thames, nearly opposite Liverpool-street, accommodating in its course not only the populous districts through which these lines pass, but embracing also the important terminal stations of Victoria, Waterloo, Hungerford, Cannon-street, Bricklayers' Arms, and London Bridge. These results might thus be obtained without further outlay of capital, or interference with property; and there would remain to be formed only a short, and comparatively inexpensive link of less than three miles in length, to complete the circle of London, effecting at the same time a junction with the Metropolitan Railway, near Finsbury Circus, and establishing also a third efficient railway communication across London (north and south).

Three main objects are aimed at by the numerous costly schemes now before Parliament, viz.:

1st. Railway communication between the Metropolitan Trunk lines on the north and south of the Thames, so that the traffic which would otherwise require to be transhipped and carted through the streets, may pass through London without change or delay.

2d. Railway

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2d. Railway communication round London, so as to admit of the uninterrupted passage of trains in both directions.

3d. Circles of railways in the more densely crowded portions of the Metropolis, in the hope of lessening thereby the existing street traffic.

Although, where the distance to be travelled is considerable, railways, by their superior speed and comfort, supersede other modes of conveyance, yet, where the distance does not exceed a few miles, and where the traffic is not in immediate proximity to the railway stations, a successful competition is maintained by means of coaches and omnibuses. The advantage of a railway over road conveyances would be greatly diminished if, coupled with shortness of distance, it moves in a circle crossed, as are all parts of London, by streets admitting of the passage in a direct line of cabs and omnibuses, and, of course, of pedestrians also; and, if due allowance be made for the loss of time in going to and from the railway stations, and waiting for the trains, it will be found very doubtful whether the proposed system of inner circular lines would effect any saving of time, or afford such material convenience as would justify the cost, and seriously injurious consequences sure to attend the construction of railways in the centre of the metropolis. It must be borne in mind, also, that although the number of persons crossing the river bridges is very great, the north and south traffic (except in the vicinity of the Thames) is comparatively small, the great stream being east and west, as is indicated, in a very marked degree, by the great thoroughfares leading to and from the City.

If the short link shown by the line dotted blue on the map is constructed, the system of the Great Eastern would be brought into direct connexion with the southern lines, as the Great Northern and Midland will be, through the centre of London, by the London, Chatham and Dover Extension, and as the London and North Western, and Great Western already are by the West London and West London Extension lines; the means of working continuous trains round London in both directions will also be obtained. The estimated cost of this necessary link is only about one million and a quarter. There remains only the question of the intercommunication between the different points in the Metropolis. For the reasons already stated, it is submitted that as respects this class of traffic, relief must be looked for rather from widening the streets than from any system of circular railways.

It will be seen by the map that there is already sanctioned a large extent of railway accommodation available for local purposes on the south of the Thames, and on the north there are three distinct lines, east and west; viz.:—

The 1st, or outer line, formed by the Tottenham and Hampstead Junction Railway.

The 2d, or centre line, formed by the North London Railway.

The 3d, or inner line, formed by the Metropolitan Railway.

There would be three lines crossing north and south, and, for the reasons already stated, these would appear to be sufficient; but if, in consideration of the great stream of traffic east and west, it should be deemed expedient to form another line of communication in that direction, so as to accommodate the population on the north bank of the Thames, as that on the south bank is accommodated by the lines of the South Western and South Eastern Companies, I am authorised to say that the directors of this Company will be prepared to co-operate for such an object in the manner already indicated.

I am, &c.
(signed) *Chas. E. Stewart,*
Secretary.

James Booth, Esq.,
Railway Department,
Board of Trade.

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55. Lord *Stanley* of Alderley.] How do they propose to give the necessary facilities to all Railways to use those different lines on equal terms?

I am not able to state in detail what they propose to do; it was intimated to us that it was their intention to call a meeting of the companies interested in those lines, to see if some arrangement could be made by which all the different companies might have the use of those lines on fair terms.

56. *Chairman* (To Colonel *Yolland*).] Will you state what railways would constitute the inner circuit group?

The extension of the Metropolitan Railway from Paddington by Notting Hill to Brompton, would be the first portion of the inner circle. There is no competing scheme with that as between Paddington and Brompton. At Brompton, no less than three schemes compete; one is the Metropolitan district scheme, which runs along Victoria-street, and under the Thames Embankment, south of Cannon-street, and ends at Tower Hill, where it is proposed to be joined by the extension of the Metropolitan Railway from Finsbury Circus to Trinity

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Square, Tower Hill. That forms the circuit as proposed by the Metropolitan Railway Company, and the Metropolitan District Railways. The same engineer acts for both. There is a second competing scheme to that, which commences at the West London Railway, called the Metropolitan Grand Union Line, which runs through Brompton, very nearly over the same ground, clear of Victoria-street, and thence along the Thames Embankment, and completes the circuit to the Metropolitan Railway at Finsbury Circus. There is a third scheme, which does not complete a circuit, but commences at the West London Railway, called the Charing Cross Western Railway, runs nearly over the same ground, as far as Westminster, and then crosses the river, and runs alongside the London and South Western Railway, and joins the Charing Cross Railway on the south side of the river. That Railway, taken in connection with the Charing Cross Railway, would establish a line that would end at the terminal station of the Charing Cross Railway at Cannon-street Station, which is in course of construction at the present time.

57. Lord *Redesdale.*] Would it be on the same level as the Charing Cross Railway?

Yes; it is all on viaduct on the south side of the river; it crosses the river a little north of the Penitentiary.

58. Colonel *Wilson Patten.*] Is the Charing Cross Western Line promoted by an independent company?

Yes; it is an independent company, I believe.

59. *Chairman* (To Mr. *Booth*).] Are there any other lines which you consider belong to this inner circuit group?

The lines constituting the inner circuit would be the Metropolitan District Railway, the Metropolitan Railway (Trinity square Extension) Bill, the Metropolitan Railway (Notting Hill and Brompton Extension) Bill, the Metropolitan Grand Union Railway Bill, the Charing Cross (Western) Railway Bill, and the Charing Cross (Northern) Railway Bill; then there are certain other schemes that compete or conflict in levels or otherwise with the schemes I have just named, and I would suggest that they could be conveniently grouped together with those other Bills.

60. Mr. *Milner Gibson.*] Are not those lines which come across projected with a different object, inasmuch as though they form part of the inner circle they seem to be for the purpose of connecting lines on the north with lines on the south, whereas the inner circle lines are more for the distribution of the metropolitan traffic?

That is so. I have not named them as constituting any part of the inner circuit; but it is considered for engineering and other reasons convenient that they should be referred to the same Committee as those schemes constituting the inner circuit proper.

61. Though they do not compete for the same objects, still it may be useful to consider them together?

Exactly so.

62. Lord *Redesdale* (To Colonel *Yolland*).] Does the Metropolitan District Railway which passes along the Thames Embankment unite in any way with the Metropolitan Railway at Farringdon-street?

No, it does not; it passes under the London, Chatham and Dover Line. There is another scheme that meets the inner circuit at the eastern side of the Metropolis; that is the London Main Trunk Underground Line, which joins the London, Chatham and Dover Railway at Ludgate-hill and Earl-street.

63. Would there be any difficulty in connecting the Metropolitan District Line with the Farringdon-street line under the lines of the London, Chatham and Dover Company?

No, it could be done; some of the schemes that have dropped proposed to make that junction.

64. Mr. *Milner Gibson.*] The Charing Cross Northern Railway would bring the traffic of three great lines, namely, the London and North Western, the Great Northern, and the Midland, all down to Charing Cross, would it not?

It would.

65. Would

65. Would not that make Charing Cross almost a central station?
It would make a large central station of the Charing Cross Station.

66. The Charing Cross Station would also have the southern system in connexion with it?
Yes.

67. Lord *Redesdale.*] Does the Metropolitan District Railway communicate directly with the Charing Cross Station?
No; it passes under it. The portion of the Metropolitan District scheme comprised in the inner circle does not propose to have any junction whatever; it has only a single junction at Brompton with the outer circle.

68. By "junction," you mean a junction on the same level?
Yes.

69. They would be able to interchange passengers at the several stations of the other Companies, whose lines they pass under?
Certainly.

70. What is the North London, Kingsland, and Tottenham Branch?
The object of that scheme is to supply railway accommodation to the suburbs.

71. Does it join the Great Eastern Railway?
A junction is made with the North London and the Tottenham and Hampstead Junction Railways.

72. And through that it gets connexion with the Great Eastern?
Yes.

73. What is the Tottenham and Hampstead Junction Extension to Charing Cross?
It commences at a junction with the Tottenham and Hampstead Junction Railway at Holloway, and runs to Charing Cross.

74. Is that in the same Bill with the Tottenham and Hampstead Junction (Alexandra Park Extension)?
No; that is a different Bill.

75. Does the Tottenham and Hampstead Extension to Charing Cross propose to pass underground?
It is a line mostly in open cutting.

76. How does it deal with the Metropolitan line?
It passes over the Metropolitan line, and under the Euston-road; there is just bare room enough; they find a part where there is 14 feet between the road and the Metropolitan Railway.

77. Colonel *Wilson Patten.*] Is that promoted by an independent Company?
It is promoted by the Tottenham and Hampstead Junction Railway Company, whose line is in course of construction.

78. What is the extent of the original line for which they have powers?
About five and three-quarter miles, connecting the Hampstead Junction with the Great Eastern Railway.

79. That Company is quite independent of any other?
I am not prepared to say whether it is actually independent of any other, or not. One of the objects of the proposed line is understood to be to bring the Great Eastern to Charing Cross.

80. Lord *Redesdale.*] The Great Eastern Company are the great supporters of the Tottenham and Hampstead, are they not?
It is understood to be supported by the Great Eastern, and it is proposed that the Great Eastern should work it.

81. Lord *Stanley* of Alderley.] How does the Hampstead, Midland, North Western, and Charing Cross Railway cross the Metropolitan Railway?
It passes under it; it is under everything; it is under Tottenham-court-road, and Hampstead-road, more than 50 feet below the surface of the road.

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82. It comes down Tottenham-court-road?
Yes; in the line of the street.

83. How does it propose to cross the Strand in getting to the Charing Cross Station?
It passes under the Strand. There are three schemes in that direction, all three passing under the Strand. One is as far east as Wellington-street.

84. Lord *Redesdale.*] What is the Tottenham and Farringdon-street line?
The Tottenham and Farringdon-street line is a line proposing to bring the Great Eastern into a station at Farringdon-street.

85. Is that promoted by an independent Company?
It is promoted by an independent Company. The Great Eastern Company are to find a portion of the capital.

86. Do the Great Eastern Company agree to find a portion of the capital?
Yes.

87. As well as make their own metropolitan station?
I do not know that they count upon succeeding in all, but they are understood to be favourable to that project; in fact, they have agreed to find a portion of the capital of that line, if it is sanctioned.

88. Lord *Stanley* of Alderley.] What are the schemes which the Great Eastern Company have for the purpose of bringing them to a more central station?
Their own scheme proper, called the Great Eastern Metropolitan Station and Railways, which joins the Enfield line, the Cambridge line, and also an intended line to High Beech.

89. Where do they propose to make their station in the City?
North of Wormwood-street, and a little south of Liverpool-street; the line is an extension of their present line on a viaduct.

90. Lord *Redesdale.*] What are the lines that propose to touch Finsbury-circus?
The Metropolitan Extension to Trinity-square and the London Main Trunk Underground.

91. Do both of those pass under Finsbury-circus underground?
They both pass underground, but in open cutting.

92. They go through the middle of the square in open cutting?
Yes; but I should mention that I have been informed that they are quite willing to make it a covered way.

93. Lord *Stanley* of Alderley.] Will you describe the object of the East London scheme?
The East London Railway Bill proposes to establish a terminal station at Moorgate-street, partly on a high and partly on a low level, to connect the Great Eastern Railway with it and with the Metropolitan Railway at Finsbury-circus, and to join those Railways, through the Thames Tunnel, with the lines south of London, near New Cross.

94. Would there be any considerable engineering difficulties in adapting the Thames Tunnel to the purposes of a railway?
It has been anticipated that there would be difficulties in getting under the London Docks; but I have heard (I do not know for certain whether it is so, or not) that those difficulties are likely to be removed, with the assent of the London Dock Company.

95. Lord *Redesdale.*] What is the gradient which would be required in order to descend to the Tunnel?
One in 50 on both sides.

96. Colonel *Wilson Patten.*] At what depth are they below the docks?
Some 20 feet below the bottom of the docks; they descend from thence to the level of the Thames Tunnel.

97. Is the Thames Tunnel so low as to admit of the railway going under the dock at the depth which you mention?
Yes; they have to descend from the London Docks.

98. Lord

98. Lord *Stanley* of Alderley.] Do you think it probable that the vibration of the railway might have any injurious effect upon the Thames Tunnel?
I think not.

99. Lord *Redesdale.*] You think that the Thames Tunnel is built as solid as the tunnels which are used for railway purposes now?
I think so.

100. What is the width of the Thames Tunnel?
Sixteen feet, I think.

101. Colonel *Wilson Patten.*] Would it admit of two lines?
Yes; each arch would admit a single line; there is sufficient room for the carriages. It is proposed to establish a station at the side of the Thames.

102. Lord *Stanley.*] Practically, there is hardly any passenger or goods traffic through the Thames Tunnel at the present time, is there?
There is no goods traffic; I believe that a million of people go through in the course of a year.

103. Lord *Stanley* of Alderley.] Do not they go through merely out of curiosity?
Mainly.

104. With regard to the two bridges which are proposed to be taken across the Thames to the east of London Bridge, at what elevation are they proposed to be constructed?
One at 130 feet and the other at 100 feet, with one arch of 750 feet span, and another of 820 feet span.

105. Do you consider it practicable to make them tubular bridges?
What has been done elsewhere could be done there. I do not think tubular bridges are proposed to be made.

106. Colonel *Wilson Patten.*] Supposing that it were left to you to decide which of the lines before Parliament now would give the greatest accommodation to the great railways in going north and south through the City of London, which line would you select?
I do not think that any one single line would carry out what is desirable, but a combination of two or more is required.

107. Will you describe to the Committee what combination you would recommend to afford that accommodation?
My opinion is decidedly in favour of the completion of an inner circle, connecting it with the West London Railway. I have not the means of going into the actual merits of the particular projects as regards the avoidance of property, or anything of that kind; but there are three or four lines that would effect the object of joining the Metropolitan Railway at Finsbury Circus to the Metropolitan Railway at Paddington; thus the Metropolitan proposes to come to Brompton and to Tower Hill. Then, in addition to that, the inner circle of the Metropolitan District Railways completes a circuit in connexion with the Metropolitan Railway, and the Metropolitan Grand Union completes a circuit as far as Brompton, in connexion with the Metropolitan Extension to Brompton. Those are the only two which make complete circuits.

108. Lord *Redesdale.*] Which is the Metropolitan Grand Union?
It begins at the West London Railway, passing through Brompton, and forming a junction at the Victoria Station; it then passes north of Victoria-street, and along the Thames Embankment, thence between Cannon-street and Thames-street, clear of Trinity-square, and joins the Metropolitan a little to the west of Finsbury Circus.

109. Throughout the greater part of that district it runs parallel to the Metropolitan District Line, does it not?
Nearly so, and to the Metropolitan Extension to Trinity-square; it takes a slightly different course.

110. Colonel *Wilson Patten.*] Supposing, for a moment, that we were to discard from our view the affording of interior accommodation to the City, and the

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question were only limited to the union of the lines north and south of London, which line would you recommend for that purpose?

The East London Line, the line through the Thames Tunnel.

111. Will you point out how the East London Line would accommodate the Great Northern, the London and North Western, the Great Western, and the Great Eastern?

The Great Northern has a junction with the Metropolitan at King's Cross, and runs to Farringdon-street at the present time. There is an extension of the Metropolitan to Finsbury Circus in course of construction, and from that point the East London proposes to make a line, a low-level line, under the London Docks, and through the Thames Tunnel, to the Southern Railway near New Cross.

112. How is the Great Western accommodated?

By means of the Metropolitan Railway, by the same route as the Great Northern.

113. How is the Great Eastern accommodated by the East London?

It makes a junction with the Great Eastern, east of their goods yard. In addition to that, there are other portions of this East London scheme which form junctions with the North London Railway, so that that would bring in the London and North Western.

114. How would it bring in the London and North Western?

By the North London City Extension to Liverpool-street, a junction is formed with the East London Line, which would enable the London and North Western to run through the Thames Tunnel.

115. Would the East London give sufficient accommodation for the traffic of those railways?

Of those which I have named.

116. Lord *Redesdale.*] Have not the majority of those railways north of the Thames also a communication to the south of the Thames by the West London Railway?

Two have; the Great Western and the London and North Western.

117. Have the Midland any connexion?

No.

118. The Midland could effect a junction with the Great Northern and Victoria Station line now proposed?

Yes.

119. It might probably be desirable to recommend that such a junction should form part of the Bill?

Such a junction might be required. The London and North Western and the Great Western have a communication by the West London Railway and the West London Extension Railway. The Midland and the Great Northern have not that connexion at the present time.

120. Have the Great Eastern any?

The Great Eastern has communication only by the intervention of the North London.

121. Viscount *Eversley.*] Do you in the main approve of this scheme sent in by the London and North Western?

I think it a desirable one; I do not think it goes quite far enough.

122. Lord *Redesdale.*] In what respect?

It does not join the Blackwall Railway, which is one of the largest omnibus lines in London, and it does not make a communication by Railway on the north bank of the Thames, between the West London Railway and the City.

123. Does the East London, or any of the branches connected with the East London scheme of the present Session, join the Blackwall Line?

No.

124. What lines would bring the Blackwall Line into connection with the other lines?

Two lines connect with the Blackwall Railway: one is the London Main Trunk Underground, but that goes no further west than Blackfriars Bridge, forming

forming junctions with the London, Chatham, and Dover on one side, and the Metropolitan Extension at Finsbury-circus on the other; and the other one is the Metropolitan Grand Union, which connects with the London and Blackwall Railway, with the Metropolitan Extension to Finsbury Circus, and the North London Extension to Liverpool-street, and also with the proposed extension of the Great Eastern Railway to Wormwood-street, so that in many respects it is more complete than the East London scheme.

125. The London and Blackwall has no scheme of its own for making such junctions?

No.

126. As connected with the former questions which Colonel Wilson Patten asked you with respect to the northern and southern communications with the different lines, has not the Great Northern also a direct communication north and south by means of the Metropolitan Railway and the London, Chatham and Dover?

It will have; it will be the shortest connexion through London.

127. And that mode of crossing would also be available to the Midland, if it should join the Metropolitan, and also to the London and North Western, if it should join the Metropolitan?

Unfortunately, the whole of the Metropolitan Railway is only a double line of way at present.

128. Lord *Stanley.*] Could additional lines of rails be laid down without great inconvenience?

The company have power to lay down additional rails between King's Cross and Farringdon-street; there are not at present four lines from King's Cross to Farringdon-street; there seems to me to be an objection to the Midland Line coming in, till there are four lines of way.

129. Lord *Stanley* of Alderley.] Have they room to make the four lines?

They have the means of acquiring the land for four lines.

130. Colonel *Wilson Patten.*] Is the East London an independent company altogether?

It is an independent Company. (Mr. *Booth.*) It incorporates a company with a capital of 2,000,000*l.* and 670,000*l.* loan.

131. Mr. *Milner Gibson* (To Colonel *Yolland*).] You said, when you were asked what you would recommend if you were called upon to advise the adoption of any particular system in London that you would first recommend the completion of an inner circle. What is the description of traffic which you think would be accommodated by the inner circle?

Residential suburban traffic, in addition to the street traffic.

132. For the distribution, you mean, of passengers arriving from short distances?

Yes, and also for taking whatever goods there may be from the north to the south.

133. Your inner circle, in order to accomplish that, must have junctions with all the lines round London?

With a good many of them. In that respect there is a good deal of difference between some of the schemes; some of them propose junctions, others propose no junctions.

134. If there are not junctions would the passengers be at the trouble of changing carriages where they are carried such short distances?

I think it would tend to keep up the number of omnibusses to a much greater extent than if there were junctions, so that the passengers could go through in the same carriages near to their destination. The principle of exchange stations is all very well as regards long traffic, where there is a good deal of luggage that could not be taken into an omnibus line, but as regards those who come up to London in the morning without luggage and leave at night, it is of great importance that they should be able to find their way rapidly into London in the morning and leave it at night, instead of having to break their journey by getting out of the train at a certain point and waiting for another to come up.

James Booth, Esq. and *Lieutenant-Colonel Yolland.*

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135. Earl of *Romney.*] How does the Metropolitan District Company propose to cross the river at Limehouse?
By a bridge of 750 feet span, and 130 feet above high water.

136. That would be a serious obstruction to vessels, would not it?
I think they have consulted the views of the Conservators of the Thames upon that subject.

137. How do they join the South-Eastern and the London and Brighton?
There are two or three junctions near New Cross.

138. Mr. *Massey.*] Do you anticipate, from the construction of this inner circle, any great relief to the traffic of the streets?
I do.

139. Is that opinion of yours founded on the experience of the Metropolitan?
It cannot be said to be founded on experience, inasmuch as there are no circular railways at the present time in existence.

140. Is not it within your knowledge that the road and street traffic on the line of the Metropolitan is undiminished?
I do not think it is materially diminished; but I think that is partly due to the great reduction in the fares of the omnibuses.

141. Practically that effect has not ensued?
I believe not.

The Witnesses are directed to withdraw.

Ordered, That the Committee be adjourned till To-morrow, Twelve o'clock.

Die Mercurii, 17° *Februarii* 1864.

PRESENT:

Lord President.	Mr. Milner Gibson.
Earl of Romney.	Lord Stanley.
Viscount Eversley.	Mr. Massey.
Lord Redesdale.	Colonel Wilson Patten.
Lord Stanley of Alderley.	Mr. Herbert.

THE LORD PRESIDENT, in the Chair.

Evidence on Railway Schemes (Metropolis).

G. Parker Bidder, Esq.

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GEORGE PARKER BIDDER, Esquire, Examined.

142. *Chairman.*] YOU represent the Great Eastern Company? Yes.

143. Can you state to the Committee the nature of the line which is promoted by your Company?

The line to which your Lordship desires me to speak, I presume, is the Metropolitan Extension to Wormwood-street. Your Lordship will see a line coming up from Tottenham to join the main line at Bethnal Green, which of course may be taken separately. Then there is an extension from near our terminus at Bishopsgate to the back of Bishopsgate Church. With regard to the latter, the object of the Company was to meet as far as they practically could, the suggestion of the Committee of the House of Lords last year. I think Lord Redesdale will perhaps recollect that when we had the Finsbury Circus Bill before the House, his Lordship suggested that we might have a station on the other side of Broad-street. The remark that I made to his Lordship was, that it would be exceedingly costly; and I was afraid too costly. However, his Lordship having thrown out the suggestion that we should investigate all the facts, we requested Mr. Hunt, of the Board of Works, and our own surveyor, Mr. Adams, to report to us the cost of the property in that neighbourhood; and their report was, that if we stopped short at Wormwood-street, the cost would be within those limits which we thought ourselves justified as directors in recommending for the adoption of our proprietary. I have only one remark to make with regard to that, which is with reference to the approaches, with reference to which I think Colonel Yolland has fallen into error from not knowing the locality, nor the objects of the Company; for the object which they had in view in selecting that was really the convenience of the approaches. In reading Colonel Yolland's report, it occurred to me that the objection which he made to the narrowness of the approach was founded on an error, for though Wormwood-street was narrow, one side of it might be taken down and formed into a carriage approach; and in consequence of Bishopsgate-street being higher than Broad-street, we should get that approach on an easier gradient than is usually practicable in the City, and we should have an access through Sun-street to the west, which is a street not of large traffic; also through Broad-street, directly into the heart of the City; also, through Alderman's-walk into Houndsditch; and also into Bishopsgate for passengers seeking to go in the direction of Gracechurch-street. On the whole, it was represented to us that that means of access would be remarkably convenient for a City terminus.

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144. Lord *Redesdale.*] Would there be a descent into Broad-street as well as Bishopsgate-street for carriages?
No, not for carriages.

145. Carriages must go down into Bishopsgate-street to come to Broad-street?
Yes.

146. *Chairman.*] What would be the breadth of the roadway, when completed, in Wormwood-street?
Twenty-five or thirty feet, I think.

147. Lord *Redesdale.*] Wormwood-street communicates with London-wall?
Yes, in a straight line with London-wall.

148. Lord *Stanley* of Alderley.] Will you describe in what way you propose to connect the station with the present line?
By a junction near George-street, on a level.

149. What would be the distance from the present station at Shoreditch?
Two hundred or 300 yards back, the intention being that the whole of our present passenger station should be given up to goods traffic. This part, where the North Woolwich traffic is carried on, would be given up to a coal station.

150. Lord *Redesdale.*] You avoid Bishopsgate Church?
Yes. The cost of the line would be three quarters of a million of money.

151. What is the length of it?
Eight hundred yards.

152. Lord *Stanley* of Alderley.] Including the station?
Yes. All our goods traffic is now carried on a lower level, requiring all the trucks to be brought to one point, in order to be raised or lowered, as the case may be. At the Brick-lane Terminus we do 10,000 tons a week.

153. Lord *Redesdale.*] The whole of your new line would be upon arches?
Yes; and devoted entirely to passengers.

154. Is it your intention to make the whole of your present station a low level station?
No; we have an approach to it now on both sides, and therefore goods waggons could conveniently come up to it.

155. Lord *Stanley* of Alderley.] Will your station in Wormwood-street be at the same elevation as your station at Shoreditch?
As near as may be.

156. How have you obviated the difficulty which, in your evidence last Session, you stated existed in respect of the different levels of Wormwood-street and Shoreditch?
The answer which I gave last year was with regard to the connexion of our line with the Metropolitan Railway. I said that we were 20 feet above the surface, and that they were a corresponding depth below the surface. I said that of course we must at some point commence an incline, which must be before we got to Bishopsgate, and that that would require a heavy gradient—a gradient of 1 in 40 or 1 in 50.

157. What is the difference of level between your line at Liverpool-street and the North London?
We should be nearly on the same level.

158. *Chairman.*] The advantage which you expect to derive from this project, is additional room and a good passenger station. The distance does not make much difference, does it?
Yes; an immense difference. If you have to go to your office in the city, and it is a wet day, you have to walk in the wet, or take an omnibus or a cab.

159. Could you effect a junction between your line and the North London at that point by which trains could communicate?
There would be no difficulty in the world in making a junction; and we have a connecting line at Stratford with the North London.

160. Is

160. Is not it contemplated that the North London is to be connected ultimately with the Metropolitan Line?
I believe so.

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161. Could the Metropolitan bring its Railway into that terminus so as to be connected with you?
No. Last year it was pointed out to us that we should, if possible, effect a direct connexion with the Metropolitan on the same level, so that trains could be got to work through upon one level. In the first place, we find that besides the objections to the gradient, that would cost us half a million more money; and in the next place, through trains are found not to be workable at present. The Windsor through trains have been given up, being found to be utterly incompatible with the Metropolitan traffic. That, of course, puts an end to any other through traffic.

162. It would depend upon the number of the lines which the Metropolitan might eventually lay down?
They cannot widen the Metropolitan.

163. Lord *Stanley*.] It is all omnibus traffic?
Yes.

164. Mr. *Milner Gibson*.] The Great Northern runs through upon the Metropolitan, does it not?
They work in upon the present line; but the arrangements are that two extra lines are to be made for their use, and the use of the Midland.

165. Lord *Stanley* of Alderley.] Are the Committee to understand that you think a junction could not be made between your line and the Metropolitan Line for the purpose of passenger traffic?
A junction could be made, but through trains could not run.

166. In your evidence last year you stated, "In the first place, we should either have had an underground communication with the Metropolitan Line, or they would have come to us. The difference of level would have been overcome by mechanical arrangements. I do not think, practically, we should work our carriages through, if we had a direct junction"?
That is what I say now. Our station last year would have been upon the upper level, and the Metropolitan upon the lower level; and I contemplated a lift.

167. Though there was not a continuous line upon the same level, yet a junction was proposed to be effected, by which passengers could have gone directly from the extreme east to the extreme west of London, by the Metropolitan?
Yes.

168. Do you still think that it would be advantageous to have such a junction, and that it would afford accommodation which is much required?
No doubt it is desirable, and London is so large, that at every point where you give accommodation, a large traffic is developed.

169. Have you any reason to alter the opinion which you expressed last year, and which I have just read?
No.

170. With regard to your answer to a question which was put to you a short time ago, you stated that the Metropolitan Railway had not the means of making more than two lines of railway. Is not it the fact that they have power to take land on either side for the purpose of making four lines from King's Cross to Farringdon-street?
Yes; as I stated, the arrangement is that the Great Northern and the Midland trains are to come in on two separate lines between King's Cross and Farringdon-street.

171. They have the means of giving the additional space necessary to make four lines?
Between King's Cross and Farringdon-street, they have. Whether they are taking land for four lines up to Finsbury, I do not know; but a plan has been submitted for our consideration, a joint plan, comprised of portions of the Grand

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Union and the East London schemes, which would effect all the objects that your Lordship points at.

172. Lord *Redesdale.*] Some of these schemes appear to pass under your contemplated station?

Yes. I am not quite aware of the whole of their arrangements.

173. Do you conceive that the East London Thames Tunnel Line would be an accommodation to your line?

Yes.

174. There is another line called the Tottenham and Farringdon-street Line? That is a line which we wish to promote.

175. That would, in fact, give you two Metropolitan stations?

It would.

176. In what way do you propose to promote that line?

To contribute a third of the capital.

177. And to work it?

Yes.

178. In what manner has that been started?

I cannot tell; it was suggested to us by Mr. Baxter and Mr. Fowler. They brought the plan to me and pointed out the advantages, which were quite obvious to me, and to our people, and we have contributed a third, on the condition that the other two-thirds are *bonâ fide* subscribed. The effect of that line is, that we could get the benefit of a connexion with the Metropolitan at that place, not only for our Cambridge traffic, but also for our Colchester traffic.

179. Colonel *Wilson Patten.*] Would that line enable you to cross the Thames by the London, Chatham and Dover, and so give you direct communication with the railways on the south side of the river?

Yes; Mr. Forbes is here, who will tell the Committee what the arrangements are by which all the Companies on the south of the Thames will be able to use their stations in common.

180. Lord *Stanley* of Alderley.] Would not most of those advantages be obtained if you could effect a junction between the Metropolitan and Finsbury Circus, and your railway at Shoreditch?

No, nothing like so well, and it would cost more money. Moreover, if I came from Cambridge, I could get to Westminster in the same time as I could get to Shoreditch. I deny the possibility of our working our through trains upon the Metropolitan. If we have to disembark passengers, and re-book them, and move them from one station to another, all long passengers would take a cab.

181. Your Tottenham and Farringdon-street takes you to Farringdon-street?

Yes.

182. Would you not there be obliged to make use of the Metropolitan, unless you used the London, Chatham and Dover?

Our passengers would have the opportunity of getting into the London, Chatham and Dover trains at Ludgate-hill; the short passengers would get into the Metropolitan trains at the Farringdon-street Station.

183. Colonel *Wilson Patten.*] What communication have you with the other great lines—the London and North Western, and the Great Western?

At present, we go along the North London, and at Kensal Green there is a line called the North and South Junctions, coming across to Clapham Junction.

184. Are you satisfied with the communications which at present exist with those lines west of the Metropolis?

Quite satisfied; passengers are interchanged at Stepney; they come down the North London, and get into our trains at Stepney. Then we have cross trains from Hackney Wick to Stratford, bringing short suburban traffic to our line at Stratford.

The Witness withdrew.

CHARLES EDWARD STEWART, Esquire; Examined.

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185. *Chairman.*] THE Committee have had before them two letters which have been addressed by you, as Secretary to the London and North Western Company, to the Board of Trade, and they would be glad to know whether anything has arisen, since the writing of those letters, which you could communicate to the Committee, and also what information you can afford the Committee as to the particular arrangements and facilities which could be given by those existing lines, and what agreement you think it is likely the persons interested in the management of those lines are likely to come to?

I will hand in to the Committee the map that accompanied those letters (*handing in the same*). The red lines show those in existence, or authorised; this line (*pointing to the Map*) from Farringdon-street across the Thames is in course of construction by the London, Chatham and Dover Company; but with that exception, and with the exception of the North London Extension to Liverpool-street, and the Tottenham Hampstead Junction Line, all the others are actually constructed. The blue line in the direction of the Thames Tunnel shows a communication which we think necessary, in order to bring the Great Eastern system into communication with the southern lines. If the levels admit of it, a communication between the North London Extension to Liverpool-street and the Cannon-street Station would effect the same object. I am not aware whether the engineering difficulties are insuperable, though I believe them to be so; but that is a question open for consideration. There is no proposal in Parliament this year for a line in that direction (*pointing to the Map*); but there is a proposal for this Tunnel line, and that is the sole reason for showing that line on the map which accompanied my letters.

186. Lord *Stanley* of Alderley.] There is an interval not executed between Farringdon-street and the London, Chatham and Dover Terminus?

Yes; but it is in course of construction. There is a Bill before Parliament, this Session, with respect to that, but the question is merely whether that portion of the line will be constructed as authorised, or with a slight deviation, and under some different arrangements with the Great Northern. There are four lines of rails, and, indeed, five, at one point. From King's Cross to Paddington there are only two; but there is great facility for laying down four lines from King's Cross to Farringdon-street. From there, onwards, and across the Thames, the line is laid out for four lines.

187. You have no connexion with the Metropolitan Railway?

No, not directly from the London and North Western Line.

188. Do you contemplate that any will be necessary for the purpose of effecting a system of communication to which you refer?

I think not.

189. Viscount *Eversley.*] How far south of the Thames are those lines carried?

To where the line branches off at Walworth to join the South London Line.

190. Lord *Stanley* of Alderley.] Would there be any communication between the London and North Western Railway, and the south of the River Thames, except by the outer circles?

There would be a communication at the west by the West London Extension Line at this point, and at the east by the blue line (*pointing to the Map*). There would also be a means of communicating with the North London through its connexions with the Great Northern and Midland, near King's Cross.

191. Viscount *Eversley.*] And then along the line to Farringdon-street?

Yes; the North London forms a communication with the Midland Line and with the Great Northern Line.

192. Lord *Stanley* of Alderley.] How does the North London Line connect itself with the Metropolitan Line?

Only by the junctions I have now referred to.

193. That is the junction with the Great Northern Line?

Yes, through the Great Northern or through the Midland.

194. The Midland has no connexion with it yet, has it?

It has a Bill in Parliament for it. Then the other connexion would be by means

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means of the West London and Hammersmith Extension and through the Paddington Station.

195. Where would your traffic going to the south of the Thames be diverted from the London and North Western Line?
At the Willesden Junction.

196. Lord *Redesdale.*] It is proposed to create a very large station there, is it not?
Yes; a large space of land has been purchased at that point, and it is intended to form an exchange station both for passengers and goods.

197. Lord *Stanley* of Alderley.] For the purpose of effecting a communication to the south of the Thames and to the east of London, it would be necessary to have that line constructed which proposes to use the Thames Tunnel?
Yes; or a line connecting the Great Eastern and North London Extension with the lines on the south of the Thames, either by that means or by Cannon-street.

198. You stated before, that the engineering difficulties in connexion with the Cannon-street Station were insuperable?
I am told so; we made a survey with the view of getting a few hundred yards forward from Liverpool-street, but the cost was so enormous that we gave it up.

199. Lord *Redesdale.*] The difference of levels would be a difficulty?
Yes; and the street would, I believe, be interfered with in a manner highly objectionable.

200. The Cannon-street Station comes out on a level with Cannon-street, does it not?
Yes, and it runs in very low, relatively to the site of the Liverpool-street Station.

201. The ground rises, in fact, to Bishopsgate-street?
Very rapidly.

202. Lord *Stanley* of Alderley.] Then, with the addition of communication across the Thames, either by the Thames Tunnel or elsewhere, on the east of London, you would have a direct connexion with the south of the Thames, quite sufficient for all the traffic which you think might require to be accommodated?
I think so.

203. That would be, I suppose, chiefly for goods traffic, and not passenger traffic?
For both. I do not think, myself, that a communication north and south would be very important for passenger traffic. I think passengers, as a rule, do not require to go through London without stopping.

204. *Chairman.*] In order to carry on the plan you have suggested, it would be necessary for the various companies concerned to make considerable alterations in the arrangements now in existence with regard to tolls and fares, and so on. Have you taken any steps to ascertain the willingness of the great companies, or whether there is any agreement amongst the great companies to such a new arrangement?
A meeting took place about ten days ago, between the Chairman of the London and Brighton Railway, the London and South Western Railway, the Great Western Railway, and the London and North Western Railway, and these letters having been sent to them previously, they expressed their concurrence in the principle laid down.

205. The Midland Railway Company, the Great Eastern Railway Company, the London, Chatham and Dover Railway Company, and the Great Northern Railway Company were not parties?
No. The South Eastern Company were invited to that meeting, but they were unable to attend.

206. Colonel *Wilson Patten.*] Were all the great companies invited?
No; only those I have mentioned, and the South Eastern Company. A meeting took place yesterday with the Directors of the Great Eastern Railway, and I believe I am right in saying that they also assent to the principle. The London, Chatham and Dover Company, I believe, also assent; but I am not authorised to state that.

207. Lord *Stanley* of Alderley.] Is the principle which the Companies were disposed

disposed to assent to, that all the Companies should have the use of those different railways upon equal terms, and with equal facilities; and that no preference should be given to one Company over another?

That there should be an interchange of facilities, upon equivalent terms, as far as practicable.

208. So that no advantage should be given to one Company over another?

Clearly; that any two Companies being in a condition to grant similar equivalents, there would be no indisposition to grant the same facilities over the London and North Western to both.

209. You speak only of the London and North Western. Would the other railways be disposed to concur in that view, and come into an agreement for that purpose?

I quite understand that.

210. And you think there would not be any difficulty in effecting an agreement for that purpose?

I do not think there would be any difficulty in an agreement being come to between the Companies I have mentioned, provided Parliament were to legislate in such a manner as to give them confidence that the agreement into which they enter could be enforced by courts of law or otherwise, in the same way as the covenants in a lease of real property.

211. *Chairman.*] Would you propose to give Legislative sanction to this agreement?

That would be quite necessary, or at least to the principles of that agreement.

212. Lord *Redesdale.*] Have you at all thought what provisions would be necessary for such a Bill?

No, beyond the general provision that when two railway companies entered into an agreement consistent with what your Lordships' House and the other House of Parliament might now determine to be for the public interest, those railway companies should be not only discouraged, but prohibited from seeking to break that agreement, as is now constantly done; before the ink is dry, they come to Parliament, to break agreements into which they have entered, although such agreements are perfectly consistent with public policy and the public interest.

213. Lord *Stanley* of Alderley.] Would you think it necessary, by legislation, to prohibit the construction of future lines which in any way might be considered to compete with those lines?

Certainly not; but if one railway company obtains the use of another's property on defined terms and conditions and for specific purposes, they should be discouraged from coming to Parliament to repudiate the agreement under the guise of some public advantage, but, in fact, to benefit themselves at the cost of the lessor.

214. Mr. *Milner Gibson.*] Would not it be well that the agreement should be for a limited period, so that there might be an opportunity of revising it afterwards?

No; I think that any such insecurity would deprive it of very much of its value.

215. Colonel *Wilson Patten.*] Would you mention the companies in detail whose lines it would be necessary to take advantage of to carry out your project?

The North London would be one.

216. That is in existence?

Yes.

217. Is that a separate company?

It is a separate company, but owned, to a great extent, by the London and North Western Company.

218. Have any of the other great companies any participation in it?

No, not any railway company; one of the London Dock Companies has to a small extent.

219. It is practically the London and North Western?

Yes,

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Yes, but it is worked separately from the London and North Western; one of its termini is at the docks; it runs from Fenchurch-street Station, over the Blackwall Railway, and it has in course of construction a new extension to Liverpool-street.

220. As regards that, the Blackwall Railway would also have to come into the arrangement, would it not?

Yes, from its Fenchurch Station technically it would, but practically the North London work over their railway, and so do the London and North Western.

221. Which is the next Railway Company whose line would have to be used?

The North London terminates at Camden, from which point the main line of the London and North Western is used as far as Willesden. There is an alternative line (also the property of the London and North Western Company), leaving the North London, and going round by Hampstead, and joining at Willesden; then from Willesden there is the West London Railway, the joint property of the London and North Western and the Great Western.

222. Has any other Company any share in that but the Great Western, and the London and North Western?

No.

223. Lord *Stanley* of Alderley.] Where does that terminate?

At Kensington, where there is to be a large station, the land being purchased and the station being partly built. From Kensington there is the West London Extension Railway, which is the property of the London and North Western, the Great Western, the South Western, and the Brighton Companies.

224. Colonel *Wilson Patten*.] Where does that line go?

To a point called Long Hedge Farm, where a junction is formed with the Brighton Line, leading into the Victoria Station.

225. Crossing the Thames?

Yes, the line crosses the river above Chelsea, recrossing it again into the Victoria-street Station. Then a junction is formed with the London, Chatham and Dover; then in the opposite direction there are two junctions, one with the Brighton Railway, and the other with the South Western, pointing towards Southampton and the Crystal Palace. Then there is a fourth junction which, though not completed, made actually up to the rails of the South Western, pointing in the direction of the Waterloo Station.

226. Authority is already obtained for that?

Yes, it is already constructed up to the rails; its completion requires only the assent of the South Western.

227. That would enable a connexion to be made with the South Eastern?

Yes, and to Cannon-street, and by that small fork to Charing Cross also.

228. Is the Bill for that small fork before Parliament?

No.

229. Lord *Stanley* of Alderley.] Are all those constructed which you are mentioning?

Yes, except the small loop leading into the Charing Cross.

230. Colonel *Wilson Patten*.] What railway companies have a share in that?

The line is the sole property of the South Western from the junction last mentioned, up to their station at Waterloo. Then a junction is formed there with the South Eastern, and so you might get to London Bridge and Cannon-street.

231. That completes the circle of London, with the exception of a line from a point south of the Thames to Liverpool-street?

Yes.

232. Earl *Romney*.] What would be the length of line required in order to complete the circuit?

About three miles or three and a-half from the the termination of the South London Railway to Liverpool-street.

233. Colonel *Wilson Patten*.] Will the blue line be above ground except under the Thames?

No,

No, it goes under the docks; it is principally in tunnel. It rises here (*pointing to the Plan.*) Then it would be necessary to connect the Great Eastern system with Liverpool-street at that point; that, and the completion of the circle, is the main object of that line.

234. Lord *Stanley* of Alderley.] Would the Great Eastern obtain a convenient connexion with the Liverpool-street Station by the proposed extension?

Yes. The proposed extension would be suitable for a junction as shown here (*pointing to the Plan*) or an additional line might be laid upon the Liverpool-street Extension of the North London Railway, there being now three lines. The suggestion was, to lay down a fourth line of railway, from Kingsland to Liverpool-street, and to appropriate two of those lines to the long traffic of the Great Eastern, and the London and North Western, and two exclusively to omnibus traffic. I believe that that would be the most effectual means of conducting the traffic. Then the Tottenham Extension, now before Parliament, would bring the Great Eastern system to Liverpool-street, in the most direct manner possible.

235. Colonel *Wilson Patten.*] What is the whole extent of the circle which you have just described?

From Liverpool-street Station *viâ* the North London, London and North Western, West London, West London Extension, and South London Railways, and the proposed Thames Tunnel line (*dotted blue on Plan*), to Liverpool-street Station, the distance would be 24 miles. From Farringdon-street Station *viâ* the Metropolitan, the Great Western, the Hammersmith and City Junction, West London, West London Extension, London, Chatham and Dover to Farringdon-street Station, the distance would be 17 miles.

236. Lord *Stanley* of Alderley.] Would there be any easy means of connecting the Liverpool-street Station with the Metropolitan Station at Finsbury?

It is proposed to do so by the Metropolitan Grand Union Railway Bill; it would be costly, as everything in that locality must necessarily be.

237. Is there anything in the levels that would prevent its being effected, if considered desirable?

No, it is a mere question of cost; there is a Bill in Parliament for effecting that object.

238. Is that the Metropolitan Grand Union?

Yes.

239. Colonel *Wilson Patten.*] I understand you to repudiate the idea of any inner circle of railways in London?

I do not believe that the proposed circular railways would be attended with any practical convenience to the public.

240. Lord *Redesdale.*] Would there be any accommodation afforded by new streets in connexion with your proposal?

No; I believe that the relief of the streets of London is to be obtained by widening the streets generally, rather than by the construction of circular railways.

241. Lord *Stanley* of Alderley.] Your Company have a project for making a small street through Euston-square into the Euston Station, have they not?

Yes; but that is a small matter; it is merely for approaching the station directly, instead of by angles; it would afford no relief beyond the immediate vicinity.

242. *Chairman.*] Is there anything that you wish to state to the Committee which you think might aid them in their inquiry?

No; I adhere to the views expressed in the letters to the Board of Trade, dated 13th and 26th January. I was not aware that I should be called before your Lordship till late last night; and, therefore, I have not had an opportunity of preparing any further suggestions.

243. Lord *Stanley* of Alderley.] Is it your opinion that it would not be of any very great importance for you to have a direct communication to some more central station in London for the purpose of omnibus traffic?

An extension from the Kensington Station in the direction of Westminster, and so along the banks of the Thames, I think, would be very important, both locally and as an extension of the London and North Western, and the Great Western systems.

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244. Do you think it would be of great importance for you to have an extension into the heart of the Metropolis, either by means of the Metropolitan Railway, or some direct line to the Charing Cross Line or any other line?

I do not think it would. That was very fully considered in the year 1860, when we prepared plans for extending the London and North Western; but the project was abandoned on account of its great cost. I do not believe that such a railway (north and south), would be remunerative as a local line, while the extension of three or four great companies to Charing Cross would create the serious evil of a great central station at that point.

245. Why do you think it not desirable for you to have a connexion with the Metropolitan Railway, seeing that it is considered desirable in the case of the Midland, the Great Northern, and other Railways to the north of London?

Because we use the North London Railway to get to the City. I believe the Midland and the Great Northern attach importance to the Metropolitan Railway, as carrying them into the City for their goods traffic, and, of course, to some extent, for passenger traffic. It is essential also that they should use the Metropolitan Line for getting across the Thames. We do that already, by means of the West London and the West London Extension above ground, which I have always considered by far the preferable mode of crossing from north to south.

246. You have also informed the Committee that you would have the means of getting on to the Metropolitan Railway by the North London and the Midland connexion with the Metropolitan?

In case of need; but I do not see that it could be usefully availed of.

247. Colonel *Wilson Patten*] Are you able to speak to the increase or decrease of omnibus traffic to and from the terminus of the London and North Western, since the opening of the communication with the City by the North London?

I am not.

248. You do not know whether the omnibus traffic to and from the London and North Western has lately been on the increase?

I am not prepared to speak to that.

249. Are you able to speak to the passenger traffic by the North London?

It is very large. The interchange at Camden is very considerable.

250. Is there any separate account kept of the profits of the line between Camden Town and the City?

That is a separate Railway altogether; seven-tenths of it belong to the London and North Western, but it is a separate Company. It pays a dividend of 6 per-cent.; but, to a large extent, that arises from goods.

251. Can you say what amount arises from passengers?

About one-half. For the half-year ending 31st December, 1863, the proportions are as follows:—passengers, 45,617 *l.*; goods, minerals and cattle, 45,036 *l.*

252. Can you state whether that line has proved to be a very great convenience as regards passengers?

Undoubtedly, very great.

253. Have you reason to believe that if other lines were constructed into the City, the public would avail themselves of them in the same way as they do of that line?

The east and west extension of the Metropolitan Railway into the City, I believe, would add very much to the utility of that railway. I believe also that a line east and west along the Thames Embankment, and so along Victoria-street and up to the Kensington Station on the West London Railway, would also be availed of to a very large extent.

254. Can you state to the Committee whether, in consequence of the North London Line being opened, there has been more building going on outside of London than previously to the line being opened?

No doubt that is so; the line was constructed through fields, now it is surrounded by buildings.

255. Do you know under what terms the passenger traffic is carried on?

It is very much an omnibus traffic; they have, I think, a uniform fare—first, second, and third class.

256. Is

256. Is that system gaining ground round London at the present time? I can only speak with regard to the North London. *C. E. Stewart, Esq.* 17th Feb. 1864.

257. Lord *Stanley* of Alderley.] Between Watford and London, with the exception of Harrow, is not there very little ground upon which any great number of houses has been built?

Very little. I had occasion to inquire what amount had been expended in building during 17 years after the opening of the London and Birmingham Railway, taking a circle, two miles round every station, from Tring to London, and the total amount expended was only 22,000 *l.* Increased facilities were given and inducements held out to parties to build houses, and in eight years 240,000 *l.* or 250,000 *l.*, were expended in building houses in the very same localities.

258. In point of fact, there has been less building in that direction out of London, than almost any other?

Yes.

The Witness is directed to withdraw.

JAMES FORBES, Esquire; Examined.

259. *Chairman.*] YOU are the General Manager of the London, Chatham and Dover Railway? *J. Forbes, Esq.*

Yes.

260. Will you state the character of your two Bills, the London, Chatham and Dover (No. 1), and the London, Chatham and Dover (No. 2)?

The Company, under the Act of 1860 and subsequent Acts of Parliament, have obtained powers to do certain things, and they have taken upon themselves obligations with reference to those powers. In the course of working out the thing, it has been found that certain modifications of the plans would be very beneficial to the working of the railways connected with the Company and beneficial to the public; and the purposes of the Bills of this Session, No. 1 and No. 2, are to empower the Company to improve and to substitute works for others already authorised which your Lordships will see upon this Plan (*handing in the same*). If your Lordships will follow the red line, that is the scheme of the London, Chatham and Dover. Commencing at the Victoria Station, is a line (blue on the Plan) in the occupation of the London, Chatham and Dover Company and the Brighton Company, running as far as that point where it passes under the South Western. The London, Chatham and Dover Line proper then continues in a circle round by Denmark-hill and Camberwell, to and over the river at Blackfriars and Farringdon, so effecting a junction there with the Metropolitan, in one direction, and with the proposed extension to Finsbury in the other. That is the line of the original undertaking for which powers were obtained in 1860; nearly the whole of that railway is constructed, and it is now open as far as the Elephant and Castle, so that the London, Chatham and Dover, from the coast, Ramsgate and Margate on the one hand, and Dover and Canterbury on the other, is brought into communication with the Victoria Station as a West End terminus, and as far as the Elephant and Castle in the direction of the City. The works between the Elephant and Castle and the river are very nearly finished, and have been enormously costly in their character. The Blackfriars Station alone, which is laid out to answer the double purpose of a passenger and goods station, has cost the Company half a million of money, from the great value of the property, the magnitude of the works, and the difficulty of getting foundations. The bridge over the Thames is in course of construction, and for the line, as far as Snow-hill, the property has been acquired; a great deal has been removed, and the works are going on. One of the great objects of the Metropolitan Extension of the London, Chatham and Dover Railway was to obtain connexion with the Metropolitan Railway. The Metropolitan Company themselves, by one of their directors and by their engineer, were very great supporters of the scheme, and it was looked upon as affording a most desirable means of communication between the south of the Thames and the north of the Thames for the Metropolitan system, the Great Northern system, and the Midland system, which now has a terminus at King's Cross; and will in the future have a sepa-

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rate terminus abutting on the Metropolitan Line The Metropolitan Company have a frontage in new Farringdon-street (called Victoria-street) which is very valuable, and which is not very convenient for the purposes of a large transfer station, and they desire to alter the junction there, and to afford a much better one for all purposes. The blue line is the London, Chatham and Dover Line, and the blue dotted line is the course of the original line, giving a junction with the existing Farringdon-street station, running through the middle of the station. This black line is the existing two-line system of the Metropolitan Railway. The Metropolitan Railway Company have discovered in the course of their experience that it is very difficult to carry on a traffic of the character of the Metropolitan traffic upon two lines of rails, though the difficulties are rather prospective than present, because at present a very much larger number of trains could be worked than they are now working; but seeing that they have an extension to Finsbury, that the Midland Company are coming into London, and with the Great Northern will have junctions with them, and so will run over those lines, they are very anxious indeed to separate the local traffic from their through and market traffic. This (*pointing to the Plan*) is the new line projected by the Metropolitan Company, and to be carried out by them in the place of the original line to Finsbury, which runs through the Dead Meat Market; at which point powers were taken by my company to effect a junction with them. They propose to lay down additional lines between King's Cross and the junction with our line. To do that, they require to alter the course of their local lines, the object being to separate from the through trains their frequent local trains, which require to run with the greatest precision as regards time, and with great frequency; and to run them independently over those lines into the Finsbury Station, and so to give the Midland Company and the Great Northern Company the means of coming by other lines from King's Cross to Farringdon-street, and effecting junctions there with us. It is intended to carry the local lines over the through lines, in order to get rid of the great complexity and difficulty of working the traffic upon crossings on the level. Those arrangements render an alteration in the course of the line necessary, and we were only made acquainted with that fact very lately. My Company are, therefore, placed in this position. This property (*pointing to the Plan*) has been purchased, and a great part of the money has been paid for it, and the works are in progress all along here up to Snow-hill (*pointing to the Plan*); it being as far as that, common to the two directions. What we apply for is, power from Parliament to enable us to effect a junction up to that point (*pointing to the Plan*); the Metropolitan Company having already the power, and having acquired the property for carrying their line to that point, and to substitute a new line for the present line (*pointing to the Plan*). If Parliament thinks fit to grant that power, our Company are still in the position of having to acquire that additional property, they being already responsible for the property down to West-street on the line of the existing authorised junction. This, in the interest of the public, and in the interest of all parties, is, no doubt, a much better scheme for carrying out the authorised junction, because, by altering the course of the lines, the Metropolitan Company get uninterrupted use of the local lines for the local traffic, while the other companies get through access north or south, or to the Meat Market. That is the Metropolitan part of our Bill, and, to us, a very important part, because 4,500,000 *l.* of money has been already spent in making 12 miles of our extension, which money is sunk, and cannot by any possibility become fruitful till this important link in the line is made, completing the connexion between the north bank of the Thames and the Metropolitan system.

261. Lord *Stanley* of Alderley.] In your Bill, you ask for power to acquire a considerable quantity of new property, do you not?

We ask for power to acquire some property; not very considerable; it is that bit from Snow-hill to join the line of the Metropolitan Company proposed to be diverted east of the existing line.

262. And to abandon a portion of that already acquired?

Conditionally, upon getting power to make that diverted line we should abandon existing powers, because it is in the interest of the Metropolitan Company, and all parties, to make the diverted line; but in the event of our not getting those powers, we should go on constructing this line in accordance with the existing powers, and the requirements of the original Bill.

263. Lord

263. Lord *Redesdale.*] Is the proposed new line of the Metropolitan Railway a high level line?

No; that line is in tunnel there (*pointing to the Plan*). One of the objections to the original scheme was, that the gradient here was 1 in 40. The City contemplate making alterations in the level with reference to the Holborn valley, and that has the effect of raising the levels of those streets five or six feet; so that with the assent of the City authorities, the gradient can be made 1 in 51, instead of 1 in 40; that so far improves it.

264. In the event of an underground railway being carried along the Thames Embankment to Blackfriars' Bridge, do you think it desirable that there should be a communication between that railway and the Farringdon-street station under the line of the London, Chatham and Dover?

No doubt; for this reason, the levels of the two lines at that point would not admit of carriages running from one line to the other; and one of the advantages of the Thames Embankment scheme would be to give communication from Westminster to Farringdon-street, and so on towards the north of London over the existing Metropolitan Railway.

265. It would be desirable for that purpose, of affording communication from Westminster to Farringdon-street, that there should be a junction between the Farringdon-street Station and any line that passed along the Thames Embankment?

Quite so.

266. That could be effected by passing under the line of your railway?

I think so; by means of exchange platforms communicating between the higher and lower levels.

267. Do you also consider it desirable that such a junction should be effected, before that portion of your railway, leading from your bridge across the Thames to Farringdon-street, should be completed?

No; I do not think that it would affect our railway. We can have no junction at Blackfriars with any railway coming from the direction of the Thames Embankment.

268. If it be desirable to make a junction between the railway along the Thames Embankment at Blackfriars, and the Farringdon-street Line, would it not be desirable (inasmuch as that line must pass under your line) that that junction should be effected before your line is constructed?

I do not think it need pass under our railway; it would come on the west side of our railway; it would hardly come as far as ours.

269. Lord *Stanley* of Alderley.] A junction could only be effected with the Farringdon street Station by means of a line parallel to yours?

Just so. There is no possibility of their getting up to our line, because in crossing the river we are obliged to carry the works very high.

270. Lord *Redesdale.*] Would not it be possible for them to use the ground acquired for the purposes of your line going many feet below it?

That would be impossible, because the foundations are so bad between the bank of the river and Ludgate, that we have had to drive piles 40 or 50 feet, and upon them to build an enormous superstructure of archwork. A line running from Westminster under the Charing Cross Railway, along the Thames Embankment, and terminating in the neighbourhood of Farringdon-street, must stop short of our railway, and must pass to the west of it under New Bridge-street, and come in somewhere at the bottom of Farringdon-street where the levels assimilate. There are some other works that bear upon this matter, and referred to in our Bills. Your Lordships will see certain dotted lines called "widening." The Brighton Company and ourselves found it very desirable to establish a circular communication between Victoria-street and London Bridge. The map shows two circles; one leaving Victoria-street, and running up in the direction of Ludgate-hill, and the other running to Denmark-hill, and then by the blue line round into the Brighton Railway and on to London Bridge. We anticipate upon these two circles so much traffic, that it was considered, looking to the lapse of a very short term of years, advisable at once to double the whole of the system; so that the Brighton Company in constructing the line, granted the

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Session before last by Parliament, have undertaken to construct their works between Brixton and London Bridge, for four lines; while we have undertaken to construct two additional lines, from the point where the red line joins the blue, to Victoria; and it is to carry out that, that we ask the powers sought for by these Bills. So that, in fact, it would end in this, there would be four lines from the Victoria Station round to the junction with the Brighton Railway, and on to London Bridge.

271. Mr. *Milner Gibson.*] You ask for running powers over all parts of the Metropolitan Railway, do not you?

Yes, we do; that arises from the fact of the London, Chatham and Dover Company having had occasion in the last Session of Parliament to consider with the Metropolitan Company and the Great Northern Company, how a link of railway of only 44 chains, somewhat over half a mile, with enormous works, and which link the three Companies thought of great mutual and public advantage, could be carried out. We, the London, Chatham and Dover Company, found ourselves not in a position to be able to carry it out single-handed; the cost of the property and the works, for a small Company like the London, Chatham and Dover Company, was appalling; and we negotiated with the two Companies I have named, as to how it should be done. We all agreed that it ought to be done, and the Metropolitan Company and the Great Northern Company were parties to a Bill which was to have been brought before Parliament for establishing that link as a separate and distinct undertaking. They were to subscribe each 200,000 *l.*, and to become in fact with us joint proprietors of the line. Circumstances arose which made it desirable in the opinion of all parties to withdraw that Bill. There was a feeling abroad about the necessity of hanging up some of those schemes, and the Bill was withdrawn; we had then to proceed under our own powers. The Great Northern Company adhered to their opinion of the importance of the link, and as your Lordships will see in one of those Bills, they take power to subscribe to it 300,000*l.* The Metropolitan Company ascertained, after having become parties to the original arrangement, that they would require to widen their own line between King's Cross and Farringdon-street; and the argument made use of by them was, "we admit the importance of the junction; we see that it would be of consequence to us to get it; but we also see that it is quite impossible to carry on the traffic on our own railway, so long as there are only two lines of rails between King's Cross and Farringdon-street. The Great Northern, the moment your line gets a connexion with us, will be sending heavy traffic in coals and minerals, and so on, over the line. The Midland Company have acquired powers to run into our system, and those two Companies will have a large traffic, and we see we must spend 200,000*l.* to lay down additional lines between Farringdon-street and King's Cross. We do not see our way to doing the two things, viz., subscribing a large sum to you to make the link which we desire to have, and spending a large sum in laying down additional lines to get to it. If you, the Great Northern, and the London, Chatham and Dover Companies, can see your way to encountering the whole responsibility of making that link, we, the Metropolitan Company, will lay down the additional lines." That was the outline of an arrangement entered into; it is not absolutely agreed, and because it is not the Metropolitan Company express some unwillingness to carry it out, unless we, the London, Chatham and Dover Company, and the Great Northern Company, in addition to having taken upon our shoulders the burden of a million and a quarter of capital, come and guarantee the expenditure required for laying down additional rails on their line. We do not see that that is a thing which ought to be asked, and running powers have been inserted in our Bill for the purpose of enabling us to prove to the satisfaction of Parliament that the interests of the public might be made secure, by giving us access to King's Cross, for which we have paid so heavy a premium in the construction of those works on the other side of the river, and on the line up to Farringdon-street.

272. Lord *Stanley* of Alderley.] Are those powers asked for in these Bills?

Yes. The Great Northern, on their part, have also an agreement with the Metropolitan under seal, entered into in 1860, recited in their Act of this Session, which, as far as language would guide one, admits of the most absolute use of that line. It is under seal, but it never received Parliamentary sanction. The Great Northern Company are going to have that agreement submitted for the confirmation

mation of Parliament. That Act expressly says that the Great Northern Company are to exercise running powers over the line between King's Cross and Farringdon-street, and that at Farringdon-street they are to have the power of delivering to, or taking traffic from the London, Chatham and Dover Railway: as was contemplated by Parliament in passing the Bill of 1860, and it was one of the strong arguments used by the Metropolitan Company themselves.

273. Colonel *Wilson Patten.*] Are you cognisant of the nature of the traffic now carried on in your Victoria Station?
Entirely.

274. Can you state to the Committee what proportion of that traffic is suburban traffic?
We have a system of trains which run continually throughout the day from Victoria to the Elephant and Castle. I may say, roundly, they run every 20 minutes. When the line is opened from the Elephant and Castle to Blackfriars, or, even better, over the bridge to Farringdon-street, we shall be induced to make those trains much more frequent.

275. Those are trains for the accommodation of that particular district?
Yes.

276. What is the amount of traffic upon your line which may be said to be suburban traffic?
On that particular loop line we are carrying 80,000 passengers a week at this period of the year; in summer we frequently touch 100,000 a week; that is upon the circle itself. I have no doubt whatever that the moment that that line is opened to Blackfriars there will be a very great increase at once, because of the increased convenience to a vast number of people who live in those districts, such as clerks in the Post Office, and people employed in the large wholesale houses and offices in London; people who inhabit small houses of 30 *l.* or 40 *l.* a year in the suburbs or live in lodgings there. They require to be landed as near as possible to the site of their employment. We can at present only bring them a mile and a half south of Blackfriars Bridge; and if they wish to spare a walk of a mile and a half they must pay by the omnibus as much money as they pay for getting up to the Elephant and Castle; but the fares which we charge at this moment to the Elephant and Castle would be the fares which we should charge for the additional mile and a half. Having a minimum fare, it makes little difference whether we carry them a mile and a half short of the Thames or carry them to the Thames. Those people would, therefore, get close to their business for the same fare for which they now get to a point a mile and a half short of it, and if it is wet they have to walk a mile and a half which they would then be spared. Therefore, I feel perfectly certain that when we get to Blackfriars our traffic will at once spring to a very large figure. We have also a line through Dulwich and Sydenham, and to Bromley and Bickley. We have a special service of trains for that which is a superior class of suburban traffic, consisting of rich people. We run trains from Bickley, where building is going on rapidly; that traffic is also becoming very important indeed.

277. Lord *Stanley* of Alderley.] Have you any trains at a lower rate still for the working classes?
We have not instituted them yet, but we think of doing this at an early day, as early as this junction of ours will enable us to do so. Taking the circular line, we should propose to issue tickets to what are called the working classes (we have not come to an absolute conclusion upon it) at 1*s.* a week for five miles, and up to ten miles 1*s.* 6*d.* a week.

278. A shilling a week for travelling both ways?
Yes; a man who took a ticket would be entitled to use it once a day in each direction every day of the week.

279. Colonel *Wilson Patten.*] What are your present charges?
They are very much regulated by those of the omnibuses; from Brixton, and that part, 3*d.* third class, and 2*d.* from some stations; and that lands them a mile and a-half short of where they want to be.

280. What is the average per mile; the lowest class?
Considerably less than 1*d.* a mile.

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281. How far would your 1 *s.* rate carry the passenger?
We think of charging the same on any part of the circle; whether the man resided at Brixton, or Wandsworth, or Walworth, there would be one fare for long or short distances, allowing the man to come to either of our stations, Victoria, or Farringdon-street, or Blackfriars. Then, with respect to the wider circle, we should charge 1 *s.* 6 *d.*; but my own opinion is that this class of traffic would be limited to a five mile circle.

282. Lord *Stanley* of Alderley.] What would be the hour of the trains most convenient for the working classes?
We have not made up our minds upon that, and we are to meet some large employers of labour in London to find out the hour that would be most suitable. There is a large class of people, smiths and bricklayers, and that description of people, who begin work at six in the morning in summer, and seven in winter. We must bring them in so early as half-past five. Then there is a different class of men who are workers in wholesale houses, docks, and offices, and so on; they want to be in at about eight; we should bring them in at half past seven, having two trains back at night; one at about half-past six and one at half-past seven.

283. Colonel *Wilson Patten.*] Have you gone into a consideration of the question as to how those men have got to their work hitherto?
They have lived in London; we have that illustrated in the case of our own men; men live at almost impossible distances from their work. At the Victoria Station some of our men have found it impossible to get accommodation near their work at such prices as were consistent with their means, and they are obliged to go long distances; some of them live at Paddington and other distant places.

284. How do they get there?
They walk. I may take the liberty of remarking, as I said before, that looking at that traffic, and in fact the great mass of the suburban traffic, it is of the utmost consequence that the people should be landed near where their vocation calls them; and we think that by these junctions with the Metropolitan and to Finsbury, there would be such an ample choice of stations that people living south of the Thames would, when coming to London by our line, find themselves landed very near where they wished to be.

The Witness withdrew.

LIEUTENANT COLONEL YOLLAND, further Examined.

Lieutenant-Colonel Yolland, R.E.

285. *Chairman.*] WHAT is the object of the Charing Cross Additional Land Bill?
They propose to acquire some lands in the vicinity of Cannon-street Station; only a very limited amount of land.

286. Merely for the purposes of their station?
Merely for the purposes of their station. It is mentioned in the Board of Trade Report, as one which has not paid a deposit; but I understand that a deposit is not required.

The Witness is directed to withdraw.

Ordered, That the Committee be adjourned till To-morrow, Twelve o'clock.

Die Jovis, 18° *Februarii* 1864.

REFORM CLUB PALL MALL

PRESENT:

Lord PRESIDENT.	Mr. MILNER GIBSON.
Earl of ROMNEY.	Lord STANLEY.
Viscount EVERSLEY.	Mr. MASSEY.
Lord REDESDALE.	Colonel WILSON PATTEN.
Lord STANLEY of Alderley.	Mr. HERBERT.

THE LORD PRESIDENT, in the Chair.

JOHN FOWLER, Esquire Examined.

287. *Chairman.*] I BELIEVE you represent the Metropolitan District Railway, consisting of an outer and an inner circuit?
Yes.

288. Will you state, without going into any engineering or financial details, generally the character of the lines proposed?
The "inner circle" may be shortly described as follows. The Metropolitan Railway at present terminates on the west at Paddington, near the Great Western Station, and it is proposed to extend it to Notting Hill, which would be as far as is desirable to carry it in a westerly direction, because it is conceived that at that point it is sufficiently near the West London Railway to divide the traffic conveniently. In an easterly direction, it is proposed to extend it from Finsbury to a little beyond Fenchurch-street. That would be the extreme eastern point. It is not proposed to form a junction with the Blackwall, but to pass under it and to form communications by staircases. That completes a communication from the west to the east, extending as far to the west and as far to the east as, in my opinion, is desirable for a communication of that character. Then, I conceive it to be necessary to carry out a similar east and west line of railway from Kensington by way of Brompton and the Victoria Station, Westminster, and along the Thames Embankment to Blackfriars' Bridge, near to Cannon-street, and to a point near the Monument. Those two would be parallel east and west communications both in the line of great streams of traffic, and would no doubt accommodate a very great number of people; but it appears to me that by connecting those two lines at each end—at the West End from Notting Hill to Kensington, and at the east end from Fenchurch-street round to near Cannon-street—the value of both would be greatly increased, and this completes what may be called a circle. It is, in fact, two east and west lines joined together at the two ends, and formed into the continuous line called the "inner circle."

289. Lord *Redesdale.*] As I understand you, the Metropolitan Railway proposes to make those portions which go from Paddington to Notting Hill and from Finsbury to Fenchurch-street, and also the connecting link from Notting Hill to Brompton?
Yes, that is all the Metropolitan.

290. And the other is to be carried out by another Company?
Yes, in very close alliance with the Metropolitan, and to be worked as one system.

291. *Chairman.*] Is the alliance described in the Bill?
I do not remember. The intention is that they shall work together as one company.

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292. Lord *Redesdale.*] At all events the Companies would have no objection to whatever stringent regulations might be made to secure harmonious working?
Certainly not; it must be practically one Company to secure full usefulness.

293. At the present moment, the Metropolitan is connected with the Paddington Station and the Great Northern Station. There is also a Bill before Parliament for its connexion with the Midland Station and by the Farringdon-street Station; it is also connected with the London, Chatham and Dover. Those are the existing connexions, and you propose that there shall be also connexions with other Metropolitan termini, namely, at Victoria-street, at Charing Cross, at Blackfriars, at Cannon-street, at Fenchurch-street, and at Liverpool-street?
Yes.

294. But those connexions are not junctions by connexion of rail, but by easy transfer of passengers from one rail to another?
That is the plan, exactly like that which would exist at Paddington now, if the Metropolitan was carried out up to the place opposite the Great Western Station, for which they have at present Parliamentary power.

295. You mean opposite the hotel?
Yes; from the platform of the Great Western, there would be the means of passengers walking to the other line, and *vice versâ*.

296. Lord *Stanley* of Alderley.] Is it contemplated in that plan to have any communication between Blackfriars and Farringdon-street Station, except by an ascent into the London, Chatham and Dover Railway?
No; it passes under.

297. Lord *Redesdale.*] Would not it be desirable that there should be a continuous communication from the west side of Blackfriars' Bridge, under Farringdon-street, to the Farringdon Station, so as to make the circuit complete there?
There is now a connexion between the Metropolitan Railway and the London, Chatham and Dover Railway at Farringdon-street.

298. Would not it be desirable that there should be a line from the Thames Embankment to the west of Blackfriars Bridge, turning up Bridge-street and Farringdon-street, so as to join the Farringdon-street Station on a level, so that there should be a complete inner circle there?
My experience leads me rather to think that though that might be done, the disadvantages would be greater than the advantages, because the proportion of the Metropolitan local traffic is so great as compared to long through traffic, and even suburban through traffic, that I think nothing should be done to diminish the accommodation that can be given to the local traffic; for instance, the average number of local passengers by each train on the Metropolitan Railway is 180, while the average number brought by the Great Northern Railway is 21, and the average number brought by the Great Western Railway, when they worked along the Metropolitan Railway, was about 10; and that proportion is even increased by the very much greater number of local trains on the Metropolitan Railway than those run by the Great Northern Railway or the Great Western; but taking the number of trains which each Company finds it its interest to run for the convenience of the public, the practical result is 180 on the average by the Metropolitan, and 21 by the Great Northern trains. That satisfies me that we must be careful how we diminish the accommodation to the local passengers, by attempting to give increased convenience to the through passengers, even though those through passengers are suburban passengers; but, of course, the preference given to local passengers must not be carried so far as to neglect other traffic. For instance, we propose to give increased facilities to the Great Northern and the Midland passengers, communicating both with the Metropolitan and with the London, Chatham and Dover, by providing additional lines for that short distance from King's Cross to Farringdon-street to enable those Companies to pass with their engines and carriages.

299. Lord *Stanley* of Alderley.] If it should be considered that the difficulties either in respect to engineering, or in respect to expense, or, in other respects, in

in the way of constructing a line from Blackfriars' Bridge to Fenchurch-street were very great, would not a great part of the object which you contemplate be accomplished by a junction from Blackfriars into Farringdon-street?

A great part would be; but, at the same time, a serious diminution of convenience would be the result; for it is the part of the City, say for a mile east of Farringdon-street, which is the district to which a very large proportion of the persons having business in London are obliged to come. At the present time the Farringdon-street Station of the Metropolitan Railway is found to be inconveniently far from the centre of business; so much so, that it is not within a walking distance; it is an omnibus or cab distance for most passengers. This fact seriously affects the traffic of the Metropolitan Railway; and we know that the result of extending to Moorgate-street will be to place it within walking distance for the great majority of people having business in the City, and, as it appears to make a vast difference in the result, both in the number of passengers, and in the convenience given, I should be very reluctant, in the interest of the public, to give up the short connecting line between Finsbury and the Monument, though it is between those points that the chief difficulties lie. There are no difficulties of importance between the Monument and Blackfriars' Bridge, and there are great facilities for making that line. But there are no doubt considerable difficulties (in consequence of the nature of the property) between Finsbury and the Monument; indeed, I have attached such importance to it that I have had three different lines surveyed and valued with the most minute care, so as to enable me to ascertain which would be the best line. And the result is that I think, if it is confined to two lines of rails, no junctions made, and the space occupied reduced to a minimum, the very great convenience of a connexion from Finsbury to the Monument may be obtained without an unreasonable amount of interference with property or with space.

300. You mean that the difficulties in the way of constructing a line from Blackfriars' Bridge to Fenchurch-street are not very considerable. Would not there be a very great interference with property and with traffic in carrying a line from Blackfriars to London Bridge?

There is very little difficulty, till we come to King William-street. Leaving Blackfriars' Bridge, the line would go along the new street; there would be no difficulty there; it would pass along the back of important property in Cannon-street, and interfere with no business property of importance; but from the Monument to the east side of Finsbury Circus the property is of an important character, and would require, in my opinion, to be dealt with in a peculiar manner. Some of the most important buildings, for instance, must be actually tunnelled under, and the business continued during the operations, and whatever expense is necessary for that must be incurred; the property is in some cases sufficiently important to require such a special mode of dealing with it.

301. Lord *Stanley* of Alderley.] Would not sufficient facilities be afforded if you made Cannon-street your terminus?

That would not complete the circle.

302. It would bring persons to the immediate centre of business?

Yes. Looking at it as an east and west line from Kensington, through Brompton and Victoria, along the Thames Embankment, up to Cannon-street, it would be a very important east and west communication, but the value of it would be very largely increased if it were connected at Fenchurch-street. I have given great consideration to this. I should not have presumed to have presented a scheme of this kind without having gone into it with a great deal of care and consideration, and I am prepared to be responsible for the details. The connecting part from the Monument to Fenchurch-street, while it is the most valuable part of the scheme, is, on the other hand, the most difficult.

303. Lord *Redesdale*.] At what average depth are the rails under the buildings there?

About 20 feet.

304. How far do you interfere with basements and other premises?

As a rule, the property would be taken down and rebuilt.

305. You said that you would pass under some buildings without taking them down?

Yes. Those would be exceptional buildings. There are one or two cases in that

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which that would appear to be the best thing to do; there would, however, always be interference, and compensation to be paid.

306. What public buildings or *quasi* public buildings do you go under?
I think I may say, none.

307. Lord *Stanley* of Alderley.] You clear the Monument?
Yes, and all the churches.

308. *Chairman.*] What are the buildings which you refer to?
Business buildings, banks, and so on. In that district of London almost every room is a separate place of business, and it would be a serious thing interfering with such buildings as those, and it would be worth the while of the Company in such cases to execute the works, when practicable, without disturbing the buildings.

309. Mr. *Herbert.*] Have you ever practically tunnelled under a house without interfering with the house?
Yes; on the Metropolitan Railway we did that in several cases. There is no difficulty in doing it; it is only a question whether it is more expensive to do it or to pull down the buildings.

310. Lord *Stanley* of Alderley.] Is it a fact that applications have been made to the Metropolitan Company for compensation for injury done to houses near the line of the railway by the vibration?
Not since the railway has been opened. During the execution, we had to buy property, and to compensate for property. In some cases it was found to be better to tunnel under it; in other cases it was found better to take it down, depending upon the value of the property.

311. Do not you go under a house in the neighbourhood of the Portland-place Station?
Yes; we pass under one house, and very near another; those were taken by the Company, and are the property of the Company, subject to a lease to the Office of Works; but so far from that being an objection, the Company have a great number of applications to take the houses at a larger rent than they expected, by which they will be secured from serious loss. They have not determined upon letting them, in consequence of the number of applications they have had. I have been in the house under which the line goes when trains have been passing, and there has not been so much noise as would be caused by the passing of a cab in the street.

312. There is no vibration which shakes the lamps and chandeliers?
Certainly not. As a rule, a railway passing under a street, creates less vibration than the passing of any vehicle. Perhaps that which creates most vibration is one of Pickford's railway vans at a trot; there you have weight and speed.

313. Earl of *Romney.*] Has there been any action for damages since the Company has been established?
No.

314. Lord *Redesdale.*] I see the distance is shorter between the Blackfriars' Station on this line, which you propose, and Farringdon-street Station, than it would be between the Blackfriars' Station and the junction with the Blackwall Railway?
Yes.

315. Would it be a saving, and give pretty nearly, if not quite as great an accommodation to the public, if the line were taken along Bridge-street and Farringdon-street to the station there, and if the communication to the east was by a line up to the junction with the Blackwall Railway, without making the intermediate railway at all from the Blackwall Railway to Blackfriars?
Yes. The only thing you would lose then, would be the connexion of the two ends.

316. You would have a connexion in the middle, and a more desirable connexion in many respects, would you not? For instance, any person coming from the present Metropolitan Railway, and wishing to get to the Houses of Parliament, would have, according to your scheme, to be sent the whole way round by the Blackwall Railway, to come back again to Blackfriars; whereas in the other case

case the through trains would pass from Farringdon-street to Blackfriars, and along the Embankment to Westminster?
Yes.

317. Lord *Stanley* of Alderley.] In the extension of the Metropolitan Railway from Finsbury to Fenchurch-street, do you pass through the North London Station at Liverpool-street?
No.

318. It would be practicable to make a connexion between the two; though not at the same level?
Yes.

319. That would give you connexion with the Great Eastern as well as the North London Railway?
Yes; that is one of the advantages of the extension eastward. There are great advantages in a circular arrangement that will occur to the Committee; in the first place very numerous trains can be run with safety and convenience. My notion up to lately was, that every three minutes' trains could be worked upon the Metropolitan Railway, but since our experience in Christmas week, I can now say with confidence that two minutes' trains may be worked without any difficulty. With the circular arrangement, of course the greatest amount of facility as regards numerous trains is given, and also (which is very important) you get no concentration; you have no terminal station or concentration. Every station is a distributing and collecting station, and therefore I should be reluctant to give up the circular arrangement, if it could possibly, without too much interference, be carried out.

320. Colonel *Wilson Patten.*] If you run trains every two minutes, you would require enormous stations for your plant; where do you propose to put them?
Those would be between the West London and Kensington.

321. Would the railway there, be above ground?
It would be on the surface of the ground there at one point. There is a short piece of red line with two forks at each end. Space is proposed to be taken there, to enable all that accommodation to be given. The plan would be, to have a line from there, and all the engines and carriages brought to and from the line at that point, but there would not be, upon the working railway itself, any large station.

322. Lord *Stanley* of Alderley.] How do you propose to take the line along the Thames Embankment?
It would be subterranean.

323. Between the river and the sewer?
Yes.

324. There would be no engineering difficulties in the way of constructing it in connexion with the Embankment and the sewer?
No; it has been looked into very carefully by the Board of Works and their engineer; and there would be no difficulty.

325. Lord *Redesdale.*] It would rather facilitate the construction of the Embankment than otherwise?
Yes.

326. Lord *Stanley* of Alderley.] Would it be above the sewer?
Yes.

327. Parallel to it?
Yes.

328. Colonel *Wilson Patten.*] You stated that you intended to have a communication with the stations of all the main lines. I observe by the map here you would be at some little distance from the Charing Cross Railway?
That is a matter of arrangement whether the point of interchange should be at Wellington-street or nearer to Charing Cross. It might be thought by the Charing Cross Company that, if placed at Charing Cross, it would be too direct a competing line with theirs between Charing Cross and Cannon-street.

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329. Would it not be desirable that parties making use of the Metropolitan Railway should have some means of getting into the country by the Charing Cross Railway at that point?
Yes; and if any line were sanctioned from the north to Charing Cross, it would be extremely desirable that means of access from the Thames Embankment to those other railways should be given by staircases.

330. Is not it essential to a line of this kind that it should afford the means of easy access to every station that communicates with the country?
I think so.

331. That is not quite the case with your line, is it?
Oh, Yes. Since the small map before the Committee was made, I have been working out the details by which a convenient communication may be given between the existing Charing Cross Station and the Thames Embankment Railway, and any line brought in from the north.

332. Do you know sufficiently of the localities to be able to say that it is easy to make a direct communication with every station?
Certainly, physically, no difficulty whatever, and it would be the interest of all parties that the means of interchange should be as convenient as possible, for a circular railway would be a feeding railway for every railway with which it communicated.

333. Mr. *Milner Gibson.*] By your Metropolitan Extension, you pass under Finsbury Circus, and under Bishopsgate-street, and so come round to the Blackwall Railway?
Yes.

334. What railway is it from there passing westward?
That is the Metropolitan District Railway; the full red is the District Railway, and the dotted line is the Metropolitan.

335. The District Railway is in connexion with the Metropolitan?
It is practically one Company.

336. *Chairman.*] Do you pass in a tunnel under Finsbury Circus?
Yes; it has been selected with very great care to connect the two ends from Finsbury to Cannon-street. The quantity of interference has been reduced to a minimum, by having two lines of rails, and having no junctions. If it is to be done at all, it must be done with the smallest number of rails, and with the smallest number of junctions.

337. Lord *Stanley* of Alderley.] Would any portion of it be open?
There would be a number of open intervals between the streets.

338. Does your line go down Victoria-street?
Either down it, or by the side of it. My own impression is, that it would be better at the side of Victoria-street.

339. You would be at a low level?
Yes; but there would be no other difficulty than was encountered in the construction of the sewer. There is gravel there, which is charged with water to a certain extent, it being affected by the tide; and it would require coffer-dams and care in the construction, but it would be nothing beyond adding something to the expense.

340. Lord *Redesdale.*] Can you make your tunnels perfectly water-tight?
Yes; in many parts of our circle, for instance, from near Victoria Station, and extending eastward beyond Blackfriars, the lower part of the tunnel must be made perfectly water-tight.

341. Colonel *Wilson Patten.*] Have you made a separate estimate of the expense of the inner circle which you have just described?
Yes.

342. What is the estimate for that?
From Paddington to Finsbury the estimate is 5,000,000 *l.*

343. Is the Metropolitan District a Company already established with a body of shareholders and directors?
No; that could not be in the present state of things as regards Metropolitan Railways; no Promoters would come before the public till more was known as to the course to be taken.

344. What is the position of the Metropolitan District at the present moment?
The Metropolitan District at the present moment is promoted by parties interested in the Metropolitan Railway, and by other parties—large capitalists, and other parties who believe that such a communication would be useful and profitable, and who would be prepared to find the capital, if it received the sanction of Parliament. At one time, certain offers were made on the part of the public to come forward and take it up, but it was thought not prudent in the present uncertainty with respect to metropolitan communications to come before the public for a large sum of money, and ask for subscriptions.

345. How do you comply with the Standing Orders, with respect to the inner circle?
The money has been deposited for the inner and outer circle.

346. How much has been subscribed for?
There have been no subscriptions asked for.

347. What amount has been deposited?
£.640,000.

348. Does that embrace the amount for the whole system?
No; the Metropolitan have deposited about 160,000 *l.*

349. Lord *Stanley* of Alderley.] What would be the proportion of the expenditure necessary for the extension to Fenchurch-street on the east and to Brompton on the west?
About 2,000,000 *l.*

350. Colonel *Wilson Patten.*] Do you know sufficient of the competing schemes with you to know whether they are proceeding by subscription?
Every one of the parties have proceeded in the same way, except parties in connexion with existing companies, like the Metropolitan Company; all the new companies are proceeding in the same way.

351. They are schemes suggested for the approbation of Parliament, for the public accommodation?
Yes.

352. Viscount *Eversley.*] Did I rightly understand you to say that the railway from Victoria Station to Westminster Bridge, where it joins the Thames Embankment, would be under ground?
Yes.

353. Would you interfere with the sewage of the district?
Yes; any scheme must interfere with the sewage of the district. But all this has been carefully considered with the Board of Works, and it is considered that those difficulties are not insuperable. In some cases, it will be necessary to construct new sewers altogether before the works are commenced; but that must be the case if any railways are carried out in this district.

354. Colonel *Wilson Patten.*] Does your plan embrace a mode of getting over the difficulty of interference with the sewers?
No specific powers are required, but communications have been had with the Board of Works, and I have no doubt others have done what I have done. I put myself in communication with them, and ascertained generally what was considered necessary to be done, because it was necessary to do that in order to prepare an estimate, and the difficulties to be encountered are not considered either by the Promoters or the Board of Works to be insuperable, or requiring any further powers than would be possessed by the Promoters and the Board of Works.

355. Does the estimate cover those expenses?
Yes.

356. Mr. *Massey.*] Supposing those works were sanctioned; no security is given that the works would be done?

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The security of locking up 640,000 *l.* would be ample security; but there would be no difficulty in carrying out any well considered and well supported metropolitan railway.

357. Colonel *Wilson Patten.*] Has the Metropolitan Railway, as far as it has been constructed, been carried out on that principle?

Yes; it was carried out under great difficulties. It was launched at first with a very small subscription list; and, being a new undertaking, very few people believed in it. The Russian war came at an inconvenient moment, and that increased the difficulties; and, from first to last, its progress has been one of continued struggle and difficulties. Personally, I felt the difficulties deeply, because I was continually told by the Board of Directors that they must rely entirely upon me both for the making of the line, and for the working of it, because the public told them it could neither be made nor be worked.

358. Lord *Stanley* of Alderley.] Is the traffic increasing?

Yes; though we have been working by engines which have been borrowed from the Great Northern Railway Company, and which are insufficient in number, and not adapted to the traffic. With our own engines, the traffic will be nearly doubled.

359. Colonel *Wilson Patten.*] You have divided 5 per cent. this half-year?

Yes, and last half-year also.

360. *Chairman.*] Will you now describe the outer circle?

The "outer circle" is very much like the "inner circle," in being a connexion of different lines forming altogether a circle. There may be said to be eleven railways converging in London—the Midland, the Great Northern, the Great Eastern, the London, Tilbury and Southend, the Blackwall, the South Western, the Brighton, the London, Chatham and Dover, the South Western, the Great Western, and the London and North Western; and it is clear that those lines could not be connected together except by a system of Railways, that would form in one way or another a circle, and that in one form or another a circle or connecting arrangement is necessary; but though that would provide the means of communicating from railway to railway, which is very important, and the necessity of which is very much felt now, I do not think that the traffic between those railways would constitute the larger part of the traffic upon the proposed "outer circle" railway. I believe that the larger part of the traffic upon it would be from the suburban districts that would be accommodated by it, and also the traffic from those long railways to a convenient West End station, say at Brompton, which is now rapidly growing to be a favourite locality. By means of being brought there, and at Kensington, and at Notting Hill, connexion would be given with the "inner circle," so that without running long trains round the "inner circle," which would be perfectly impracticable, there would be an advantage given both to the inhabitants of the districts traversed, and to the long railways of this inter-communication by means of the "inner circle." For instance, besides giving the Great Western and the London and North Western access over the West London to the "inner circle," it gives the Midland Railway Company direct access to the "inner circle" at Kensington and Brompton and Notting Hill; and also, by the connexion across the river, it gives them the means of communicating with the London, Chatham and Dover Railway, the South Western, and other railways. The same facilities would be given to the Great Northern, the Great Eastern, and to those who chose to use it, and my opinion is (besides its being absolutely necessary to be made for the purpose of communicating conveniently with the "inner circle," and giving the advantages which that junction would give) no attempt to pass the required traffic over the West London and the West London Extension could be accomplished without greatly increasing the number of rails, and complicating the lines very much indeed. The West London Extension is an access to the Victoria Station; the Great Western use it very little yet, but will use it very largely. Four companies use that line now for traffic in different directions, and yet neither the Midland Railway, the Great Northern Railway, nor the London, Chatham and Dover Railway, have power over it; therefore, there must be some limit to the number of companies that you must put upon lines that have already developed traffic and been designed for other purposes. These were the considerations that induced me to feel that there must be provided a means of getting from north to south on the west side of London, independently of the West London Extension

Extension Line. The short connecting line from Kensington to the West London, gives all those railways which have access to it from the south or the north the power of communicating with both the "inner" and the "outer circle" at Kensington. That part of the scheme was absolutely necessary in any case.

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361. *Chairman.*] You mean that that small branch would be necessary, even supposing that Parliament rejected the outer circuit?

Yes; apart from the outer circuit, that connexion with the inner circuit is absolutely necessary. The next portion, from Hampstead eastward, is under different circumstances. There are already two lines from Hampstead eastward, one the Hampstead and City Junction, and the other the Midland. It appears to require some explanation why a third line is introduced there; in the first place, the levels of the Hampstead and City, and of the Midland, are not consistent with the red line being carried on by those means; and, in the next place, if it were so continued forward, it would not do, for a mile in length, to have it dependent upon another company. Therefore, there must be an independent line from that point. Then, the question is, whether beyond that it is better to increase the number of rails of the North London or to make independent lines. The present state of things is this, beginning at Willesden, to the left, instead of adopting the principle of laying down four lines on the main line, a loop is formed, called the Hampstead and City Junction, coming into the original line a little below Camden Town; from that Junction to Kingsland, where the Liverpool-street Line starts, power has been obtained to lay down additional rails for the accommodation of traffic to the City. So that for the North London purposes, four lines would be required. The question is, whether it is better for the parties, or the public, to lay down still more lines over the same ground, or to adopt the principle which the London and North Western have adopted in their Hampstead and City Junction of laying down a loop line; I have adopted the latter principle on two grounds. In the first place I find that it would be cheaper to lay down two additional lines further into the country in consequence of the less value of property; and in the next place (which is more important), we should accommodate a new district. There is no use in laying down four or five or six lines on the same ground, unless there is a very large saving of expense. In my opinion in this case, there is no saving of expense, and you do not give accommodation to a new district. When the North London Railway was first made, it was a suburban district, it is now practically a Metropolitan Railway; houses have grown up to it in a solid block. Therefore, it appeared to me a great mistake to make the additional accommodation dependent upon the existing line, attempting to get additional accommodation by new rails, because, besides not giving accommodation to a new district, you complicate matters by five or more lines of rails; the stations become complicated, and lines become complicated, and it is very much better as a general rule to lay down loop lines than to lay down additional rails for any such distance as from Hampstead to Hackney Wick. There are exceptions to that. In the inner circle, between King's Cross and Farringdon-street, it is proposed to have four lines of railway, two being devoted to the Metropolitan inner circle local traffic, and two to the through traffic. Between Notting Hill and Brompton, it is proposed to have four lines, so that the inner and outer circles may not interfere with each other; but to adopt that plan along the whole line, instead of having a new line, would be, in my opinion, a serious mistake, especially in the interest of the public, inasmuch as it would be preventing another district from having the advantages of a new communication, without saving any expenditure of money. Of course there are other reasons for making a new line. If you are to be dependent upon any one company for any part of such a communication, especially a company who might be largely interested as a competitor with the others, you cannot give the independence which appears to me very important in considering the question of the nature of the intercommunication between existing Railways. I arrived at this conclusion after great consideration that, on the whole, it is much better to lay down new lines. Then I get to Hackney Wick. Between the Great Western and Hackney Wick, I propose to purchase land for four lines, but only to construct two in the first instance. From Hackney Wick, there would be two lines of rails only. At Hackney Wick, I form junctions with the Great Eastern

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to Stratford, with the Great Eastern to Bishopsgate-street, and with the North London, so as to give communication with all the northern Railways and the Docks. From that point we propose to rise to pass over the Thames at Limehouse.

362. Lord *Stanley* of Alderley.] At what height is your bridge?

One hundred and thirty feet above high-water. That would cause no inconvenience to any vessels.

363. Would that enable any vessels to pass without striking the topmast?

I think that about three vessels would have to strike top-gallant masts, and only three, and those very rarely come up there. It may be assumed that 130 feet would be attended with no inconvenience whatever.

364. Do you take it over with a single arch?

The bridge would have a single opening of 750 feet span, which, though formerly might have been looked upon as a formidable thing, would not be a serious matter, and certainly not a difficult matter now.

365. Would it be on the principle of the Menai Bridge?

No; much more like the Saltash Bridge, on the principle of a truss, by which we have great economy and great stiffness. The Menai is on the principle of the beam, which, though applicable for moderate spans, has been given up by engineers for large spans. It is an extravagant construction for more than 100 feet.

366. *Chairman.*] Have you at all considered how you should divide the portions of this work while being constructed, so as to reduce to a minimum the inconvenience to the public, which undoubtedly those works would cause?

Yes. I think that certain parts of this work must be done out of the London season. That was the case in some of the works at the Victoria Station. I think it was required in the Act of Parliament, or by some agreement that certain works were to be done within certain periods; that is to say, that they should not be in progress during the London season. That condition was observed, and no complaint I believe was made, and I think that in carrying out such a work as this, it would be desirable for something of the kind to be done, viz., that certain works should not be executed during the time that London was full, and there would be no difficulty in that. A great part of the work would be done without inconvenience, except in the neighbourhood of Westminster, where of course special precaution must be taken. There is scarcely any part which would interfere with the public thoroughfares. In constructing the Metropolitan Railway, Baker-street was never closed for a moment. There would be no difficulty in keeping cross streets open during the progress of the works.

367. Lord *Redesdale.*] It is only where you block up the whole length of the road that inconvenience would occur?

No doubt. In the New-road there was great temporary inconvenience during the progress of the works. That would not arise here.

368. Earl of *Romney.*] There is no London season as regards Farringdon-street and the Monument?

Those thoroughfares would be crossed. Those ought to be maintained without being closed for a moment. In the works now being carried across Aldersgate-street and Long-lane, we shall not stop up any of those streets.

369. Lord *Stanley* of Alderley.] Is any part of the works completed beyond Farringdon-street?

No.

370. Lord *Redesdale.*] Is the line in construction?

A great deal of the property is purchased; we have a large quantity to buy. My arrangements for that work are, that there shall be no streets stopped for a moment. I should be quite willing to come under that obligation, that no street should be stopped during the progress of the works.

371. Colonel *Wilson Patten.*] Do you mean that no street should be impeded?

Yes;

Yes; that there should be a temporary bridge, so that the traffic may be always continued across it.

372. Do you mean you would give the same width of street?
Yes.

373. It would not be impeded, as the streets are now, by the erections where the sewers are being constructed?
No, it is the mere cost of a temporary bridge; there would be no difficulty in doing it.

374. The whole of your inner circle you propose to carry on without interruption of the public thoroughfares?
At Westminster, where, to a certain extent, it must go along the streets, for instance, between the Hospital and the Abbey, it would be almost impossible to prevent there being some temporary contraction there; but at the same time the street might always be preserved open for traffic.

375. That is a broad thoroughfare?
Yes; and therefore there would be less difficulty in preserving the communication; but there would be much greater difficulty in preventing their being some temporary contraction; I think that some temporary contraction must occur there.

376. *Chairman.*] With regard to the works at Westminster, would it be possible to construct them during that part of the year in which Parliament did not sit?
Certainly; I should contemplate that those works would be done during the period when Parliament was not sitting.

377. Colonel *Wilson Patten.*] What time do you propose to take for the whole of your works?
I think five years would be the time.

378. Working at those intermediate times, you think that five years would be sufficient?
Certainly; the part from Paddington to Brompton could be rapidly executed.

379. *Chairman.*] How long did the Metropolitan Railway take?
About two years.

380. Mr. *Herbert.*] How near do you go to the Houses of Parliament?
Two or three hundred feet. I have communicated with Mr. Barry upon that subject, and ascertained that there would be no difficulty in making an arcade from the station to communicate with the Houses.

381. Lord *Redesdale.*] How near do you go to the Abbey?
About 100 feet.

382. Earl of *Romney.*] What is your level there?
The level there is as little below the surface of the ground as possible, consistently with the difficulty as regards the drainage; across the Broad Sanctuary 16 feet 4 inches is the depth below the surface; at St. Margaret's-street it is 18 feet 10 inches.

383. Lord *Redesdale.*] You do not think that there would be any danger, considering the extremely porous character of the ground there, of weakening the foundations of the Abbey?
I am quite sure that there would be no danger; the sewer was taken at the same level which was at the same distance.

384. You will, at that point, occupy the site of the sewer?
Yes. No effect can be produced by the execution of this work, which would not have been produced by the sewer.

385. Lord *Stanley* of Alderley.] How do you get on to the embankment at the end of Westminster Bridge?
Under Manchester buildings, at a depth of 19 ft. 10.

386. Colonel *Wilson Patten.*] Are those levels which you have given, the depth to the rail?
Yes, from the rails to the surface of the ground.

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387. What would be the height of the arch?

Thirteen feet six from the rail to the top of the arch inside. The ordinary thickness of the arch would be 18 inches; in some cases it would be two feet. Where a special construction is necessary, we can diminish the thickness by using iron.

388. Is that the thickness on the Metropolitan now?

Yes.

389. Under large buildings?

Under large buildings we adopt a special construction; that is, according to the weight to be put upon it, as under the houses at Portland-road, it is all ironwork. It is only to know what we have got to carry to provide accordingly; but ordinarily it would be 15 feet to 15 ft. 6. above the surface of the rails. The difference between that and the surface would be the thickness up to the street.

390. What is the thickness from the upper part of the arch to the level of the street?

We generally like to give from two to three feet.

391. Mr. *Milner Gibson.*] You cross the river twice?

Yes; for the purpose of enabling communication to be made with railways west of London, as well as east of London, so that nothing need pass mid-London beyond that which is absolutely necessary. There is already a communication through mid-London by the London, Chatham and Dover Railway, and the Great Northern Railway, down the Fleet Valley. It appeared to me that no other mid-London communication was necessary, and it only required east and west communication, besides the lines outside London, to prevent inconvenience, and also to complete the circle.

392. That necessitates two additional bridges across the Thames?

Yes; but the bridge near Battersea Park is not at all formidable, and would be a useful work, and not the least so for the facility of access to Battersea Park. I believe it would be found to be a most valuable work in enabling the public to get to Battersea Park, which is not so much used as it would be if it were more accessible.

393. Between Westminster Bridge and Earl-street, or Blackfriars' Bridge, your line comes within the line of the Thames Embankment?

It does; and it need not be seen or known to exist between Westminster Bridge and Blackfriars' Bridge, any more than in the New-road the Metropolitan Line is seen or known to exist; it may or not be desirable to have stations or openings at intervals, but it does not in the slightest degree interfere with the Thames Embankment.

394. Nor would you interfere with the river beyond the edge of the Thames Embankment?

No.

395. Earl of *Romney.*] As I understand, you run within the sewer?

Within the space enclosed by the embankment wall and the shore.

396. Mr. *Milner Gibson.*] Do not you contemplate the inner circle of railways being used for the distribution of the suburban traffic?

It would be eminently useful in affording the means of collection and distribution of passengers by those very frequent trains. Very frequent trains, carrying a large number of passengers can be worked at very low charges. For instance, the average charge on the Metropolitan Railway is under 3 *d.* each, and notwithstanding that the earnings per train per mile is 10 *s.* 6 *d.*; the average earnings on all the railways in England being about 7 *s.*

397. Would not the suburban passengers, if they have to change carriages, still continue to go in omnibuses and cabs, as they do now, rather than be carried by the railway?

No, certainly not. In the first place you could not introduce suburban through trains upon the inner circuit, without destroying its great value; and in the next place we find that the great thing that is wanted is certainty and frequency of communication. I can illustrate that in a striking way by what has taken place on the Metropolitan Railway. Sometime ago, the Great Western Company ran their trains,

trains down the Metropolitan Railway; during the time they ran them, a very large number of persons preferred to run into the existing Great Western Line at Paddington by the trains that ran into that station, and then cross over the bridge to get on to the Metropolitan Line. A large number of persons preferred to do that rather than avail themselves of the trains that ran along the line. The great thing is to have the greatest possible number of trains running in the "inner circle", and have the means, if possible, at every terminal station of communicating with it; for instance, the alternative to that would be that the inner circle must have four lines instead of two, which would be fraught with difficulties of every kind, not the least being the difficulty of cost. It could not be made with four lines along the Thames Embankment. Then to lay down four lines from the Thames Embankment through the crowded part of the City, with such junctions and means of working suburban trains as you must have, to make it useful, would be to interfere in a very large degree with the City, and, in my opinion, with no corresponding advantage. One reason why local trains can be run so conveniently and numerously is this: you have always a fixed number of carriages, consequently there is no making up of trains. Now at every station terminating in London there must be a making up, there must be spare carriages; those things are quite incompatible with very numerous trains. To have numerous trains, you must have fixed conditions; you could not combine the two on the same lines of rails. If you attempt to add two additional rails for the purpose of working the suburban traffic, you must have physical junctions at every one of the terminal stations, which is an impossibility, because they are all at different levels. The Victoria is on the surface of the ground; the inner circle, however made, must be below the surface of the ground. Charing Cross is 30 or 40 feet above the level of the Thames Embankment; Earl-street, the same; Cannon-street, the same; Fenchurch-street, the same. Every one of those lines would have to be connected in coming from the higher level to the low level, cutting up the streets and stopping them in many cases. Whenever you attempt to get from a high to a low level, you must cross the streets and block them up. If that was to be attempted, not only would the cost of doing it be an insuperable obstacle, but there would be interference with the existing stations so great that no company would submit to it for a moment. If you attempted to dig into Victoria Station by going at a low level, you must destroy so many lines of rails and so much platform, that its use as a terminal station to that extent would be diminished. The true thing in my experience (and of course I have had great experience) is to make the distribution by the "inner circle" as perfect as possible by running numerous trains, and by making the communication with all the terminal stations of the long lines as convenient as possible, but to avoid all junctions with them.

398. Lord *Stanley* of Alderley.] Is there sufficient space in the stations on the Metropolitan Railway to afford accommodation to every passenger that comes, even when there is a great crowd?

Yes; the passengers have very seldom any luggage, and knowing the times, they come very nearly at the time of the trains starting, and the moment they get out they are quickly distributed. But we find this: that it is absolutely necessary to provide separate staircases for entrance and exit. Whenever we have attempted to combine them, we have been obliged to make a new arrangement, and make them separate.

399. Has the making of your Railway reduced the number of omnibuses and cabs along the New-road?

That I am not prepared to say. It certainly must have reduced the number of people travelling by omnibus.

400. It was stated last year that the amount of omnibus traffic remained pretty much the same, and that a new traffic had been developed by the railway; do you think that that is the case?

There is a good deal of foundation for that; I believe that the character of the omnibus traffic is lower than it was, and on the railway we have a higher and a lower class than originally travelled by omnibus. We carry many who would not ordinarily travel by omnibus, and we carry, in the third class, many persons who are rarely seen in omnibuses.

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401. Do you carry in the morning many of the working classes from west to east?

Yes. I should suggest in the case of the district, or any other similar railway being made, that provision should be made as far as possible for carrying people from the suburbs backwards and forwards, early in the morning, at a low cost. I do not think that it would be onerous on the Company, and it would be attended with considerable convenience.

402. Colonel *Wilson Patten.*] What is the difference in level between your line and the Charing Cross Line?

I think 43 feet. A staircase could be made from one to the other.

403. Earl of *Romney.*] That is the greatest difference of level of any?

Yes; the least difference would be at Victoria..

404. Colonel *Wilson Patten.*] How many steps would be required to get up 40 feet?

About 70.

405. Lord *Redesdale.*] I believe you are the engineer of the Tottenham and Farringdon-street Railway?

Yes.

406. What is the object of that line?

The object of that line is to extend the Eastern Counties Railway into Farringdon-street, where it would form, in the opinion of the promoters, a convenient terminal station for the Great Eastern, and also form a communication with the Metropolitan Railway, and the London, Chatham and Dover Railway.

407. Do you not think that that is in a great degree open to the objection of making too much of a central station at Farringdon-street?

It would, no doubt, to a certain extent, be a terminal station of the Great Eastern; but it would not be the only terminal station of the Great Eastern. That Company, as your Lordship is aware, propose to extend their existing terminus up to near Liverpool-street. One great object of the Tottenham and Farringdon-street Railway is to form a communication with the London, Chatham and Dover, and thereby get convenient access to the south of London. This is one of the attempts, out of many, on the part of the companies converging at London to get access to different parts of London; the Great Eastern Company have felt the disadvantage of being only in one part of London; the Brighton Company, as well as others, have now stations in different parts of London to their great advantage.

408. That line is favoured, to a certain extent, by the Great Eastern?

They subscribe a third of the capital.

409. Was that the original intention when the Railway was started?

It was the original intention of the Company when it was started. It was initiated, in fact, by the Great Eastern themselves; and I can say, it would not have been proposed to Parliament, except it had been, from the first, promoted by the Great Eastern Company.

The Witness is directed to withdraw.

JOHN HAWKSHAW, Esquire; Examined.

J. Hawkshaw, Esq.

410. *Chairman.*] WHICH Railway Bills do you represent?

The Charing Cross (Northern), and the Charing Cross (Western).

411. Will you state the character of those Railways, without going into engineering or financial details?

The Charing Cross Northern Railway is proposed for the purpose of making a communication between the station of the London and North Western in Euston-square, the proposed station of the Midland Company near King's Cross, the station of the Great Northern at King's Cross, and the Charing Cross Railway at Charing Cross; and also to serve the intermediate district as a Metropolitan means of communication.

412. Lord

412. Lord *Redesdale.*] Is it an under-ground or an above-ground scheme?
Under-ground; that is to say, it is sunk below the level of the ground; and, therefore, will pass under the streets, so that the streets may be covered over, and a portion on each side of the streets, if it is thought desirable, can be covered over.

413. How do you deal with the Metropolitan Railway?
We pass over it.

414. Are you there above ground?
Just at the junction with the Great Northern, we are on a level with the ground; but we get under-ground the moment we cross the road. We raise the Euston-road 5 feet 6 inches, and pass the road over the line.

415. How do you cross the Strand?
We go underneath the Strand.

416. And come up to the level of the bridge?
Yes; we join the bridge at its present level.

417. Lord *Stanley* of Alderley.] Into Charing Cross Station?
We run alongside of the Charing Cross Station at a lower level, and join the Charing Cross level at the end of the bridge.

418. Lord *Redesdale.*] What is the gradient of ascent there?
One in 45.

419. *Chairman.*] Will you describe the Charing Cross Western Railway?
The Charing Cross Western Railway is proposed for the purpose of establishing a communication between the West London Railway at the Kensington Station and the Charing Cross Railway, near the Waterloo Station, thereby forming a communication along that Railway with Cannon-street and with Charing Cross. That is what it effects in the way of junctions; but, it is also proposed, for the purpose of affording a communication from the West End of London to the City and to Charing Cross, and to such of the railways as are brought in connexion with the Charing Cross Line.

420. Lord *Redesdale.*] You propose to be on a level with the Waterloo Station?
Yes; we are upon a level with the Waterloo Station. The mode in which the line is arranged there is such that it would enable the trains of the South Western to pass on to Cannon-street or into Charing Cross, if they thought fit, without going through the station of the South Western, which is very much too crowded for that purpose.

421. You propose to cross the river by a bridge a little above Lambeth Bridge?
Yes.

422. At what elevation?
Twenty feet above Trinity high water.

423. How do you cross the roads by the Penitentiary?
Millbank Road we cross over at a height of 18 feet; then the next is Devon-place, and we are 16 feet 6 inches over that.

424. How do you pass Victoria-street and Rochester-row?
We go underneath Victoria-street.

425. How do you approach the Victoria Station?
We pass the Victoria Station in cutting.

426. You are under-ground?
Yes; from Regent-street we get under-ground and remain under-ground till we get quite in the country.

427. Colonel *Wilson Patten.*] Is it a cutting open at the top?
Yes; the line is so arranged that if it were desirable it could be covered over, and the cost of making it an open cutting with side walls, and the cost of covering it over would not materially differ, because when retaining walls must be made to carry a bank of earth behind them, they have to be much stronger, and if there is an arch between them it helps them; I have laid out

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the line so that it could be covered over, but I think it would be most undesirable for it to be covered over except in special cases; near Cromwell-road, for instance, it would be necessary to have it covered over, but, generally, I think it would not be desirable to cover it over, because railways are better and pleasanter where they have daylight and fresh air.

428. Lord *Redesdale.*] From Victoria Station to your junction with the West London, you pursue very much the same course as the Metropolitan District Railways?
Yes; the Metropolitan District and the Metropolitan Grand Union, and the line which I propose, are all about the same level near the Victoria Station.

429. From there to the West London, do they take the same course?
No; the Metropolitan District Railway follows the course of my line pretty nearly till it gets near Kensington Gardens, and then it turns up past Kensington Gardens.

430. There is another line running from the West London into the Metropolitan District Railway at Brompton?
Yes; but the lines are not quite the same. Supposing it were desirable or necessary to combine with our line so much of the Metropolitan District Railway as comes from Paddington and passes round Kensington Gardens, and falls into the line of the Charing Cross Western Railway near the Exhibition, it is quite possible to combine them at that point.

431. Lord *Stanley* of Alderley.] Where would your line terminate?
At the Hammersmith-road. We join the West London a little south of the Kensington Station. Three lines are projected north of that station to Kew, and so forth. Supposing that any of those were made, those lines from Richmond and Kew, would by means of that line, the Charing Cross Western Railway, have a continuous and nearly straight line through the west of London, to Cannon-street and to London Bridge.

432. Lord *Redesdale.*] What is the character of your bridge across the river?
There are two arches of 95 feet span and 16 feet high; two arches of 105 feet span and 17 feet 6 inches high; two arches of 115 feet span and 19 feet high; and one arch of 120 feet and 20 feet high.

433. Therefore, the bridge, though level along the top, is not level in its arches?
No, it need not be.

434. Of what material would the bridge be constructed?
Of iron.

435. Earl of *Romney.*] With regard to the height above the water, how is it compared with the new Westminster Bridge?
The highest opening of new Westminster Bridge is 22 feet, I think.

436. Yours being 20 feet?
Yes.

437. Lord *Redesdale.*] Has it received the sanction of the Thames Conservancy Board?
There has been no objection to it, so far; it would have to receive their sanction.

438. There would be no difficulty in attaining a greater elevation?
No; but it could not be required to be higher than Westminster Bridge.

439. Mr. *Milner Gibson.*] By your Charing Cross (Northern) Bill, you propose to take powers to enter into working traffic arrangements with a number of different companies; with the Great Eastern, for instance. Where do you communicate with the Great Eastern?
We do not communicate with the Great Eastern, and that is rather a matter for the Parliamentary agent; there is a line projected called the Tottenham and Hampstead Extension to Charing Cross, which I think reaches the Great Eastern

Eastern, it is shown yellow upon the Board of Trade map. I cannot tell what is to be the result of all these lines; but supposing it were thought necessary to make so much of that railway as extends from the present authorised line of the Tottenham and Hampstead to the Euston-road, the levels would admit of its joining the line which I propose, to Charing Cross, and if it were made to join the line which I propose to Charing Cross, it would have to be done under some arrangement, and therefore that Clause has been introduced into the Bill. Of course, I am giving no opinion at all upon the propriety of such a line.

440. You contemplate that if this Charing Cross Northern Line were made it would accommodate the through traffic from the Great Northern, the London and North Western, and the Midland, and also the local traffic of the Metropolitan?

Yes.

441. Could those two objects be accomplished with one pair of rails?

No; I propose from the point of junction where the three large Companies converge, to make four lines of way.

442. Colonel *Wilson Patten.*] Do you mean four lines of rails south of that point, up to Charing Cross?

Yes; I do not think that two would be sufficient.

443. Viscount *Eversley.*] Would not the effect of your plan be to make the Charing Cross Station a great making-up station for all those lines?

No; I should deprecate anything of the kind. In the first place, there is not space for it, and in the next place it is not necessary that it should be done, as the public do not require it. The mode in which I think it should be worked would be this, and I have already discussed with the Great Northern people the arrangement of the Great Northern Station for that purpose, that trains would start—say, from the Great Northern Station—local trains to Charing Cross, and some of them would run to Cannon-street along the Charing Cross Railway. I would so arrange those trains, that a gentleman arriving by the Great Northern, who wanted to go to Charing Cross or Cannon-street, or who lived in Kent, could step on to a platform on the other side of which this train would stand, and get into that train, and go on to Charing Cross, or Cannon-street, or London Bridge.

444. It would be managed by exchange platforms?

Yes; that is the general mode. But at the same time I have made junctions with those lines, the Great Northern, the London and North Western, and the Midland, because it is possible, perhaps, that in the case of a train like the Northern Express, which leaves at half-past eight at night, with a limited number of passengers, and goes through to Aberdeen, and so on, it might be worth while to run that train from Charing Cross or Cannon-street, and it might be worth while to run the Irish Express from the same places; and, therefore, there is a junction for that purpose. But of course it would be unnecessary and useless to attempt to run the trains of the Great Northern, or any of those other companies generally, from that station. In fact, there would be no room.

445. Earl of *Romney.*] In your opinion, is it desirable, for local traffic, that a line should have junctions with large stations, or that it should run near them, so that passengers might go from one to another?

It is better to have both modes where you can, because there are occasions when it is desirable that a train should pass through. It might be desirable, for instance, in the case of Her Majesty, or on particular occasions, with special trains or excursion trains. At Victoria, I do not get a junction, because it would be difficult to get one; but where you are able to get the two things, namely, a platform by which to exchange, and a junction also, it is a double advantage. The fact of your having a junction, does not necessarily govern the mode of working, but there are cases in which it might be desirable to run a train through.

446. Colonel *Wilson Patten.*] Have you made a detailed estimate of the expense?

Yes.

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447. What is the estimate of the expense from Charing Cross to those three great Railways?
£. 2,000,000.

448. What is the expense from Charing Cross Station to your station at Hammersmith-road?
£. 2,600,000; 4,600,000 *l.* for the two lines.

449. Lord *Stanley.*] Is not there already through communication between the south and the north by the new Blackfriars' Bridge, and so to Farringdon Station, by the Metropolitan Railway?
There is no communication through as regards the South Eastern district; as regards Dover, there would be the means of getting out of the Great Northern Station into the Metropolitan, and going by the Metropolitan and the London, Chatham and Dover to Dover. From Euston-square and the Midland there is no connexion, and there is no communication with Cannon-street or London Bridge, or the country, served by the South Eastern, including those populous places, such as Blackheath and Greenwich. The London, Chatham and Dover does not serve those districts. There is another small Bill which I represent, to obtain three or four houses, which we are obliged to take. In our Bill of last Session, the City authorities put in a clause compelling us to widen Dowgate-hill; and the Bill is partly for the purpose of taking property for that. We take two or three houses for the purpose of widening the station.

450. Earl of *Romney.*] With regard to the facilities for running long traffic and short traffic, do you, as acting for the Charing Cross Railway, find any difficulty in getting the two traffics to work together?
No; we have opened the Charing Cross Railway merely on to the end of the bridge. In the course of six weeks, I hope we shall be able to bring the whole of the trains into the station.

451. Do you find no practical difficulty in working long trains where there are short trains every 10 minutes?
No; not where the distance is short. A short train starting from London Bridge is at its terminus in two or three minutes after it starts.

452. Supposing that the long train is late?
Supposing that the long train was late, and that it came at the time when a short train was starting, it could not be delayed more than a couple of minutes. The difficulty will be greater in proportion as the distance which the two trains have to traverse is greater. If the short and long trains have to go along the same line for five or six miles, and the short train is a picking-up train, the difficulty of following it with a long train would be greater; but where the distance is only from London Bridge to Charing Cross, supposing that a long train arrives when a short train is just starting, two minutes after the short train has started the long train might follow.

The Witness is directed to withdraw.

THOMAS BOUCH, Esquire; Examined.

T. Bouch, Esq.

453. *Chairman.*] YOU represent the Metropolitan Grand Union?
I am the engineer of it.

454. Will you state the character of the railway?
It commences at Kensington Station and goes by Brompton to Sloane-square, where there will be a station, then to Victoria Station, and so using the Thames Embankment, and so on to a junction with the Blackwall Railway. It is a railway proposed to be under-ground all the way, except where it approaches the Blackwall Railway, where we come up and join it. It is not intended to be wholly in tunnel; where the property is most valuable it will be so, with sufficient

ficient open spaces for ventilation. It is proposed to have four lines of rails. It joins the Victoria Station in passing, and there are some other small junctions: in the City it joins the Metropolitan and also the proposed Great Eastern extension to Wormwood-street, and also the City branch of the North London Railway. There is also a bridge across the Thames at Tower-hill for connecting it with the railways on the south side.

455. Lord *Redesdale.*] What is the character of that bridge?

It is 100 feet high and spans the entire river with a span of 820 feet. In fixing the dimensions of the bridge I applied to the Conservancy of the Thames, and they made a minute on their books, that they should have no bridge less than that, and I adopted that.

456. Is it a tubular bridge?

No; a malleable iron bridge; it is more of the character of a truss bridge, and it would be made of Bessemer steel. In laying out this line, I laid it out to fulfil the conditions of the Report of the House of Lords last year, and I had that Report in view except in this idea: I wanted to utilize the existing lines for forming the outer circle, instead of making a separate outer circle. I had a line from Brompton, across the park, and I consulted the First Commissioner of Woods and Forests about that, in order to make it as little objectionable as I could, to connect the west end of the Metropolitan line with mine at Brompton. I also have a connexion with the east end of the Metropolitan Railway at Finsbury Circus. Since the plans were deposited, the Metropolitan Company, by a Bill of their own, have a branch from Paddington round to Brompton, and the limits of deviation coincide. As they came to me, I thought I had no occasion to go to them, and I have dropped that branch. That is the only thing that is dropped at this moment. With respect to that part of the Report of the Committee of last year which refers to a line crossing the Thames at the east of London, I, in the first instance, laid the line through the Thames Tunnel, to utilize that; but afterwards, having given it all the consideration I could, I decided upon adopting a bridge. But if the Standing Orders of the House had permitted me, I would, for precaution's sake, have had an alternative line; but what with dealing with the Thames Conservancy and the owners of the Tunnel, it was difficult to find what would be the best plan till I knew the conditions. I selected the bridge. We have met the East London, which takes the Tunnel, and if it suited the requirements of the Metropolis and the wishes of the Committee, we would drop the bridge, and take their line in lieu of it; and there has been an agreement to that effect.

457. Lord *Stanley* of Alderley.] Are there any engineering difficulties in the way of using the Thames Tunnel for crossing the Thames?

No; I do not consider that there are any. I am not one of those who think that there could be any engineering difficulty in carrying a line through the Thames Tunnel. I believe that it would be more costly than is generally thought, especially in getting underneath the docks; but I certainly do not think that there is any engineering difficulty in the way of doing it. But the principal reason for keeping to the bridge was, that there can be but two lines through the Thames Tunnel; and if the line is to pay, it must embrace omnibus traffic, which we have in view; and if the Committee will permit me, I will put in a small sketch, showing the direction in which the traffic would go. For instance, I connect with the Brighton Railway at Victoria. I connect by the bridge with them again at Bermondsey. There is no other company intervening between the Brighton and myself, and I intended to give them running powers for the Crystal Palace trains from Victoria right round by the Crystal Palace, and so come over my bridge, and along the Thames Embankment, and so completing that circle. If those numerous trains were coming through the Thames Tunnel, I was afraid that with only two lines of rails there might be an obstacle in the way of expansion hereafter. That was what induced me to take the bridge.

458. Which of the two would be the most costly, making use of the Tunnel, or constructing a new bridge?

I do not believe there would be a great deal of difference; the bridge would be really less costly than most people fancy.

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459. Lord *Redesdale.*] The expense of the bridge would be very much reduced, would it not, if the Conservancy of the Thames were to permit you to lessen the span?

It would very much, but I would not propose it; in justice to the shipping, I would not have suggested a less span.

460. Do you think that 100 feet height is sufficient?

I think amply sufficient; they do not require more; it is above the docks.

461. Lord *Stanley* of Alderley.] Would not the land required to be taken be much more costly by the line with the bridge than the line through the Thames Tunnel?

On the south side, undoubtedly it would be so; I have less land to take on the north by adopting the bridge.

462. Would not the line be through a valuable part of the town by Fenchurch-street?

No doubt that is valuable, but from Tower Hill I have a low-level line to complete the inner circle; I have a low-level line to Finsbury Circus to allow the Metropolitan to join the inner circle; the high-level line comes exactly over the low-level, so that I use the same land, and I do that to avoid taking much property; in that way I get two lines of railway with one destruction of property.

463. Earl of *Romney.*] You avoid the expense of getting under the London Docks?

Yes.

464. Which would be very heavy, I presume?

I do not think that there would be a material difference between the cost of the two plans, but I do not want to urge mine in opposition to the East London, because the two could be combined very well.

465. Lord *Redesdale.*] What is the estimate for the whole scheme?

Four millions. The principle of the line is that of a common highway for omnibus and suburban traffic; we would not work it ourselves, but have four lines of railway, and allow the Metropolitan Company round the Inner Circle to continue their quarter of an hour trains through. I would allow the Blackwall trains to run through, and the North London omnibus trains to run through: this sketch shows the circles of the traffic. That red line is the proposed line; it joins the London and North Western at Kensington, and it joins the London and North Western, or North London again at Fenchurch-street, thus completing the outer circle; it would enable the Metropolitan to complete their inner circle; the Great Northern, who have running powers over the North London, could run into it; it would enable them to run in in the form of the figure 8; it would enable the Brighton and Crystal Palace to run in that circle, and it would enable the London, Chatham and Dover to run in the inner circle. I would give them running powers, with this condition, not only that they should have the privilege of running, but that they should be compelled to run. In that case, we would not have trains of our own. I would attach with the privilege that condition, and that necessarily involves a certain amount of negotiation; and to a certain extent that has been going on; I have seen all the companies about it, and they would be only too glad to get those circles.

466. Lord *Stanley* of Alderley.] You propose to construct along the Thames Embankment four lines?

Yes.

467. It has been stated that there would not be space for that purpose. Do you consider that there would?

Abundant space; they propose to make the Embankment 100 feet wide.

468. Mr. *Milner Gibson.*] Your line of deviation is outside the outer line of the Thames Embankment?

Yes. I do not think that any line should be permitted there, unless there were four lines of rails. It is of great importance that it should be made while those works are going on.

469. Lord *Stanley* of Alderley.] You propose to run your line parallel to the sewer?

Yes.

Yes. That is a matter of arrangement with the Metropolitan Board of Works. I may mention that I have been in communication with the Chairman, and in a very short interview made this proposition to him, "If you will allow us to make our railway under your Embankment, and along the new street, we will allow you to carry the low-level sewer eastward along our line, past Tower Hill, to prevent your tearing up Cannon-street, Eastcheap, and Great Tower-street," which would be a very great nuisance; and they must do so if they have a low-level sewer there; and that is a place where the City traffic could not be very well diverted. Therefore, to get it along our line would be a great convenience.

470. Earl of *Romney.*] You propose to me your line parallel with the sewer, and under the embankment?
Yes, under the embankment.

471. Lord *Redesdale.*] Is there room for four rails under the embankment?
Yes, the embankment is 100 feet broad.

472. You would not have your lines in one tunnel?
I would have them in a double tunnel. Another principle which I have had in view in laying out the line is this; I have no terminal station at all on any part of the line; it is merely a connecting line with roadside stations; and there would be three platforms in those roadside stations; there would be one centre platform between the two lines of rails of double the width, and one on each side. The stations themselves would be simply built over the line of railway, not on either side of it, and in that way we get the cheapest kind of station; we occupy the least possible extent of ground, and, at the same time, we have the most convenient station. I have been going a little into the question of the expense of those terminal stations, and I find that really, there is no great terminal station which has cost less than a million. That is what has added so seriously to the cost of lines like the Charing Cross. I wanted to make this simply a connecting omnibus line; the traffic coming on to it would come beyond the limits of it, and over it.

473. As I understand you, you said that you joined the Victoria Station?
We do.

474. On the same level?
Yes.

475. How do you proceed afterwards?
We come by a branch out of their station on to our line; unless I made that junction, the Crystal Palace trains and the London, Chatham and Dover trains could not make those circuits; in fact, I want all omnibus lines in and about London to get their trains on to my line, so that the suburban traffic should be carried to and fro without change of carriage?

476. At the Victoria Station you cross the public road at the station itself?
We do.

477. Being on the same level with the rails at that point, how do you get under or over that road?
There are two lines at the Victoria Station; the Brighton Line on one side, and the London, Chatham and Dover on the other. From this west end of the station, my two lines run there (*pointing to the Plan*), under the bridge, and again fall down here, and come underneath the passenger platform of those lines.

478. What is the gradient there?
One in 40; but it is very short; less than three-quarters of a furlong.

479. Do you form any through connexion with that station to the west?
Only through those Companies who let them utilize their lines.

480. You have no communication with them to the west?
No.

481. Anything to go to the west must come out and go back again?
Yes; I might have made a junction with them, but I consulted all those Companies, for I wanted to meet all their requirements, and it was not considered advisable.

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482. Do you alter the level of Lower Belgrave Place?
No; we alter the level of no roads except where we go up from one level to the other in the City; that is in an inferior part of London, north of Hounsditch, and that is the only case in which we do it.

483. Lord *Stanley* of Alderley.] What is the whole cost of your scheme?
Five millions, with the branch through the park; since I have dropped that, it is four millions.

484. Lord *Redesdale.*] You know the other schemes, and the estimates put in for them; do you conceive that your estimate is formed upon a principle similar to that on which sum the others are formed?
I disapprove of many of the estimates. I have taken all the care I possibly can with my estimate, and I believe it is sufficient.

485. You know that your estimate is below some?
I am not aware that it is below; I rather think it is not below. We traverse very poor property all the way from Kensington till we get to Blackfriars Bridge. When we come there, we get to valuable property, and there is no doubt we must pay very largely for that property; but then being underground and mainly in tunnel, we will have it to dispose of again.

486. You go down Victoria-street, do you not?
No; I have guarded against that.

487. Do you go to the north of Victoria-street?
Yes; there is some vacant ground just behind which I take. I keep to the north of Victoria-street the whole way; and I come into the Broad Sanctuary just near the hospital.

488. Do you come under the hospital?
Between the hospital and St. Margaret's Burial Ground.

489. How near to the Abbey?
Not nearer to the Abbey than the outside railing of St. Margaret's Burial Ground. I take the line of road there.

490. Where do you pass the Houses of Parliament?
I go across at Bridge-street into the Thames Embankment.

491. Where do you go into the Thames Embankment?
A little below the bridge. I know a little about the making of the sewer in Victoria-street. A few feet below the surface of Victoria-street you come to high-water level, and the gravel is all alive with water; and I am perfectly certain that it is beyond the power of any engineer to build a tunnel there without shutting up Victoria-street. It is below the level of high water, and full of water, and you must open it to build a tunnel in it, and cover it over again; and I thought that it would be such an obstruction to the traffic that I endeavoured to avoid it by going to the north of Victoria-street altogether.

492. Lord *Stanley* of Alderley.] In the line you take, would not you meet with the same difficulties as regards water?
Yes; but I am upon open ground, and nobody complains; I could not open out Victoria-street without stopping the whole traffic.

493. Lord *Redesdale.*] What level do you take with regard to the sewer?
The sewer would drain the railway.

494. Do you cross the sewer?
I do not cross the low-level sewer anywhere.

495. You cross the sewer through Broad Sanctuary, do you not?
Yes; that is the Victoria sewer.

496. What are your levels with regard to the low-level sewer?
The rails will be three feet above the low-level sewer at Westminster Bridge; five feet at the Temple; and 28 feet at Great Tower-street.

497. How do you propose to deal with the Victoria sewer where you cross it?
Across the Broad Sanctuary I merely divert it along the south-west side of the railway into the low-level sewer.

498. Carrying it to the south of your line?
To the south-west of my line. I will have to do that in some other cases of sewers, and I think it is the best way to bring them down alongside the railway into the low-level sewer.

499. According to your arrangement the low level sewer would be on the river side of your railway?
Yes; or I could put it between the two tunnels.

500. Your levels would admit of it?
Yes.

501. Mr. *Milner Gibson.*] Do you effect a junction with the Great Eastern Line?
Yes; the Great Eastern Company propose a line to Wormwood-street; they were kind enough to give me their levels, so I made a connexion with them.

502. Do you mean a junction?
Yes; with their proposed line; besides that, they run trains down to Fenchurch-street now; we would communicate with them there as well.

503. Lord *Redesdale.*] How do you communicate with the Charing Cross Station?
We have merely an exchange station there.

504. What is the difference in the levels?
Thirty-five or forty feet.

505. Have you had any communication with the Metropolitan District Railways, with whom you run in direct competition?
I am in the habit of meeting my friend Mr. Fowler.

506. Do you imagine that there is any probability of some agreement being come to among the competing schemes?
There are certain schemes ready to agree together; and, as far as the Metropolitan Railway is concerned, there is no difficulty with it; with the Metropolitan District Railway there is more. The Metropolitan Railway Company have a line to Brompton, and a line to Tower Hill. If it were considered advisable, I would not object to waive my Tower Hill Branch; but the Metropolitan District Railway is on a very different principle from mine.

507. Your levels coincide at Westminster Bridge with those of the Metropolitan District Railway?
Yes; they do.

508. But the Metropolitan District Railway, as I understand you, only proposes to make two lines, while you conceive four lines to be absolutely necessary?
I do not think that the line would be useful without it?

509. You mean with only two lines it would have afterwards to be extended to four?
Yes; if any other companies are allowed to go near it.

510. Do you think that there would be any other traffic of importance except what may be called omnibus traffic along this line?
No; I look upon this as serving suburban and omnibus traffic. I think, if you attempt, on the plan proposed by the Metrepolitan District, to bring the suburban traffic by the suburban lines to the stations along the inner circle, then require the passengers to get out, and from one level go to another, 35 or 40 feet below, which is like descending or ascending the shaft of the Thames Tunnel, and then to wait the inner circle trains, or the suburban trains, as the case may be, to carry them on to their destination. If this plan be adopted, I am quite sure the suburban traffic will not use the lines, but continue to use omnibuses as at present.

511. You do not think that two lines would serve the omnibus traffic?
No; I do not. If there were only two lines, the Blackwall traffic, for instance, would not get any farther than Fenchurch-street; and all those lines coming in from the suburbs would be in the same position. If there were four lines, it

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would enable them to go on without change. I want the arrangement to be that passengers should get into their train, and come to the part they want to go to without change.

512. You do not, however, consider it desirable to mix up suburban and omnibus with through traffic?

No; I do not think that long through trains from distinct termini should come on our line at all.

513. Then why do you require the four lines?

For the number of companies coming on and using the line. Supposing that we have the Metropolitan Railway coming on, they would have trains every quarter of an hour; then there would be the North London Line coming on from Fenchurch-street or City Branch every quarter of an hour; and then there would be Crystal Palace trains every quarter or half an hour; the London, Chatham and Dover Metropolitan Extension trains every quarter of an hour; the Great Eastern suburban trains every quarter or half an hour. The Great Northern figure eight trains every quarter or half an hour. You cannot carry on that traffic on two pairs of lines.

514. We have had evidence before us that the Metropolitan Company, under disadvantageous circumstances, runs a train every three minutes, and they expect in a short time to run one every two minutes; do not you suppose that that sort of trams could accommodate any possible traffic that could arise?

If you take those lines I have mentioned, you could not accommodate these trains by running every two minutes.

515. Do not you conceive that in a line of this sort there ought always to be an exchange?

Yes; between the great through traffic, but not with the suburban traffic. From Clapham, for instance, and elsewhere, if people had to come by our line, and then had to change to another, I do not think we should get them.

516. Earl of *Romney*.] You are of opinion that this scheme, in order to answer, must have four lines?

Yes. Unless it had four lines, I would not recommend a railway to be put there at all.

The Witness is directed to withdraw.

W. H. Le Feuvre, Esq.

WILLIAM HENRY LE FEUVRE, Esquire; Examined.

517. *Chairman*.] YOU represent the Hampstead, Midland, North Western, and Charing Cross Junction Railway.

I am one of the engineers.

518. Will you state generally the character of the line?

The line is intended to connect the London and North Western and Charing Cross Railways, and to accommodate the local traffic coming from Camden Town, down the Hampstead Road and Tottenham Court Road, and down towards Charing Cross. In connexion with the line a new street is proposed from the bottom of Tottenham Court Road, by widening certain streets and making a piece of new street up to Upper St. Martin's-lane; we then utilize St. Martin's-lane and widen a portion of St. Martin's-lane, and come out at the intersection of Chandos-street with King William-street, and on to the Thames Embankment. We thus form a new street from Oxford-street to the Thames Embankment.

519. This plan proposes to make three new streets as well as a railway?

It is divided into three streets, but it would be virtually one street; it would be the most direct street running north and south, that could be made.

520. Lord *Stanley* of Alderley.] How do you cross the Strand?

We go under the Strand; we have a connexion with the Charing Cross Line. We have stations at Haverstock Hill, and the Red Cap, Camden Town; we

we have another at the turnpike-gate near Mornington Crescent, and we have also a station at the New Road for the exchange of passengers from the Great Western, the Great Northern, and the Midland Lines with the Charing Cross Line. We have a station at Oxford-street for the local traffic, and a station at the junction of our line starting at Charing Cross.

521. Colonel *Wilson Patten.*] How are your levels as compared with those of the Charing Cross Railway?

We have a gradient of 1 in 40 after passing the Strand.

522. Lord *Redesdale.*] You do not join the Charing Cross Station except on the bridge?

We join on the bridge; our main station is proposed to be under the surface of the Thames Embankment, so as to work in with any railway that may be carried along the Thames Embankment.

523. Joining it at right angles?

We have a junction with rather a sharp curve. I may mention that we take very little property; the new street which we form would go through a very inferior class of property (Seven Dials), and it is a street that has been proposed a great many years; some 15 or 16 years ago, plans were laid before the Goverment by Mr. Pennethorne.

524. Mr. *Milner Gibson.*] Do you stop up any streets?

No; we are below the surface of the road the whole way; we do not affect the surface of the streets at all.

525. *Chairman.*] Have you entered into any agreement with the Companies with whom you propose to make a junction?

We have seen the officials of the London and North Western, but no arrangement has been entered into; our line would be, to a great extent, a local line as well as a through line.

526. Colonel *Wilson Patten.*] What is your estimate?

A million, in round numbers.

527. Mr. *Milner Gibson.*] You go under the Metropolitan Line?

Yes; we should have a station for the interchange of passengers there. The one station would be above the other.

528. *Chairman.*] How much ground do you propose to take for the station at Charing Cross?

We do not propose to pull down any houses at Charing Cross. We propose to make a station under the surface of the Thames Embankment. It would depend upon the Metropolitan Board of Works how much they would allow us to have.

529. Lord *Redesdale.*] How do you propose to get up to the bridge?

We have a junction starting from Lumber-court, Seven Dials—a separate line altogether.

530. You have two lines from Seven Dials to Charing Cross?

Yes; we might abandon that junction, if it were thought desirable, from Lumber-court to the Charing Cross Line, and have a station there for the interchange of passengers, the same as we have with the Metropolitan Line.

531. Colonel *Wilson Patten.*] Where do you propose to have your main establishment for your engines and carriages?

At Camden Town.

532. Lord *Redesdale.*] Do you take separate ground for it?

Yes; we also reference a portion of the London and North Western property at Camden Town Station.

533. Do you take any property not in the Camden Town Station?

Yes, we take some; we take the backs of some gardens in Adelaide-road.

534. Colonel *Wilson Patten.*] What would be the extent of your station?

One acre.

535. Do you take any houses at Charing Cross?

No.

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536. Mr. *Milner Gibson.*] As to the stopping up of streets, you take in your Bill power to stop up all streets in the course of your intended line?
Yes.

537. Why do you take power to stop up streets, if you do not want the power?
I think the Parliamentary Agents put in that clause as a matter of precaution.

J. R. M'Clean, Esq.

JOHN ROBINSON M'CLEAN, Esquire; Examined.

538. *Chairman.*] YOU represent the Tottenham and Hampstead Junction Railway?
I am the Engineer of that line.

539. Will you state the general character and object of the proposed extension of that line, without going into engineering or financial details?
The extension to Charing Cross is partly a revival of a line which was before the Committee of the House of Lords last year, called the Metropolitan, Tottenham, and Hampstead, and which was thrown out by their Lordships in consequence of a junction with the Metropolitan Line, which was held to be contrary to some of the principles laid down by their Lordships. The line now under consideration commences by a junction with the Tottenhan and Hampstead Line in course of construction. It passes nearly in the same direction as it did last year, down to Euston Road, on the east of Saint Pancras Church; from that point it proceeds to Charing Cross, where it makes a station abutting on the present Charing Cross Station.

540. Lord *Redesdale.*] How does it cross the Strand?
It passes under near Wellington-street. The object is to get a long station in front of Adelphi-terrace, parallel to the river, and between the Terrace and the street which was authorised two Sessions ago to be constructed by the Metropolitan Board from Wellington-street to the Thames Embankment. By crossing the Strand a considerable distance from the present Charing Cross Station, we get a convenient station on the slob.

541. How do you cross the Metropolitan Line?
We go over it; and only raise Euston-road one foot.

542. What height is your tunnel at that place?
Fourteen feet; I arranged the height with Mr. Fowler.

543. Is 14 feet sufficient for the passage of engines?
Yes.

544. Lord *Stanley* of Alderley.] Is the whole of the line subterranean?
No. At certain places it would be open cutting; where the ground is valuable or the district populous it will be covered.

545. Lord *Redesdale.*] How do you cross Oxford-street?
Under it, clear of the Middle Level Sewer; we do not interfere with the main-drainage.

546. Colonel *Wilson Patten.*] Do you go under the drain?
No; over it, and also the High Level Main Sewer; in all places we improve the present drainage.

547. *Chairman.*] Do you propose to take any ground at Charing Cross for a station?
Yes; this is a copy (*producing the same*) of the Thames Embankment Plan. The line passes in this direction, in front of the Adelphi-terrace, up to the Charing Cross Station (*pointing it out*). Our station would abut on the Charing Cross Station, and without interfering with the levels of that railway.

548. What is the extent of the station on the slob?
By moving this road, as shown on the deposited plans, we get three and a half or four acres. The whole of this would be level, and on the same level as the Charing Cross Station (*pointing to the Plan*) for nearly a furlong and a half.

a half. A junction-line, if required, might be made, also on the same level, inside the fan of the Charing Cross Railway. *J. R. M'Clean, Esq.* 18th Feb. 1864.

549. Colonel *Wilson Patten.*] Have you any idea of the value of three or four acres of land where you propose to construct your station?
The present value is nothing. It is merely foreshore or slob.

550. Lord *Redesdale.*] You stated that your line commenced by a junction with the Tottenham and Hampstead; you had, also, a Bill this Session for a line north of the Tottenham and Hampstead?
Yes, up to Alexandra Park.

551. Does it join any other Railway?
It joins the Great Northern Railway.

552. *Chairman.*] With regard to the use that would be made of this station; for what traffic would the station be available?

Suburban traffic. There would be a great many stations on the main line, including Tottenham, Stamford Hill, Holloway, Highgate, Hampstead, Kentish Town, Camden-road (Mother Red Cap), Somers Town, Euston-road, Holborn (Lincoln's Inn). The principal traffic is north and south, and the object is to bring all the traffic to this point (Charing Cross) in connexion with the River Thames (*pointing to the Plan*). Junctions are shown, at Euston with the Metropolitan and London and North Western, and at Camden with the Midland. These only show what may be done, but are not an essential part of the scheme.

The Witness is directed to withdraw.

JOHN S. BURKE, Esquire; Examined.

553. *Chairman.*] DO you represent the East London Railway? *J. S. Burke, Esq.*
I do.

554. Are you the Engineer to it?
Yes.

555. Will you state the general character of the line?
The main objects of the line are to form connexions between the northern and eastern railways in the suburbs of London, and the southern and eastern railways through the Thames Tunnel, utilising the Thames Tunnel. The line will also form the means of taking goods from the London Docks, the Surrey Docks, and the Commercial Docks to the different railways, and thus relieve the traffic of the most crowded streets in the City. It would also be the means of extending the Metropolitan Railway from its extension to Finsbury-pavement, through the Thames Tunnel, to the southern and eastern railways, thereby forming almost a direct line from the centre of London through the Thames Tunnel.

556. Colonel *Wilson Patten.*] Do you join the Metropolitan Extension to Finsbury on the same level?
Yes; it will also be the means, by connexion with the North London at their proposed Liverpool-street Station, of forming a circle, of which the North London will form the northern portion, the West London the western portion, and the South London Railway (belonging to the Brighton Company) the southern portion.

557. Lord *Stanley* of Alderley.] Can you get into the Liverpool-street Station upon the same level as the North London?
Yes.

558. Then you would not be upon the same level as the Metropolitan?
The system I have adopted is to have one line placed over the other. We form those junctions at a considerable saving of property by doing so. The mode of doing it is rather complicated, and would require some little time to explain.

559. You propose two junctions, one at a higher and one at a lower level?
The lower one being with the Metropolitan, and the higher one with the North London.

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560. Lord *Redesdale.*] And, practically, through the North London you are on the same level as the proposed extension of the Great Eastern?

Practically so. The proposed extension of the Great Eastern to Wormwood-street would clash with our junction with the North London, if they extended beyond Liverpool-street.

561. If you join the Great Eastern, you could effect your junction also with the North London a little further on?

We could effect a junction with the North London a little further on, but it would involve this: if the Great Eastern Line were extended to Wormwood-street, all the omnibus traffic along the North London, and passing on by our line in that circle, would have to cross the main traffic of the Great Eastern on the level; but there would not be the slightest difficulty in a joint arrangement of stations at Liverpool-street for the Great Eastern, ourselves, and the North London. Indeed, such a plan has been sketched out and approved of, to a certain extent, by the North London.

562. We have also understood that communications have passed between you and the Metropolitan Grand Union, which comes to the same point?

Yes; that is with the object of the Metropolitan Grand Union abandoning the bridge and their southern lines and their northern connexions, and effecting a junction with our line.

563. Are you quite satisfied that there are no insuperable difficulties in passing under the London Docks?

Quite.

564. Have you any opposition from the London Dock Company?

At present we are negotiating with them; but I have arranged with their Engineer a mode of passing under. It is only a small channel connecting two docks that we pass under.

565. Lord *Stanley* of Alderley.] At what depth under the Docks do you pass? What would be the distance between the bottom of the water in the dock and the surface of the rails?

About 23 feet; we have plenty of room.

566. Lord *Redesdale.*] What is the steepest gradient of descent on the northern side?

One in 50.

567. What is it on the southern side?

Practically, 1 in 70. The 1 in 50 is with the load; all the coal would come from the north.

568. Do you propose only a double line of rails?

Our estimates are only for a double line of rails; but we have scheduled land for four lines, and it is possible that some of the junctions we have laid down would be abandoned by arrangement, so as to leave sufficient capital for four lines.

569. What is your estimate?

£. 2,015,000.

570. Lord *Redesdale.*] Have you had any experience in making lines underground in the Metropolis?

Not in the Metropolis. I have had considerable experience with Mr. Brunel and Mr. Stephenson in the construction of lines during the last 30 years.

571. Do you know at all the character of the soil in the central part of London?

I have had borings taken along the whole of this line. In the London Dock district, 35 feet from Trinity highwater-mark, we come to the clay.

572. Where you get beyond the Blackwall Railway on the higher ground, what is the soil there?

It is artificial-made ground to the depth of 18 or 20 feet, and then you get into gravel.

573. In passing through that, is there any danger to be apprehended? Do you think of shaking the foundations of the houses that are built in it?

I do not anticipate that there would be any more difficulty in construction than in the clay.

574. The

574. The clay would be so much below the surface, that there would be no action of the weather upon it in any way?
No; the difficulty would be in the clay slipping.

575. Lord *Stanley* of Alderley.] Do you anticipate any danger to the Tunnel from the vibration that would be produced from railway trains passing through it?
I think not; we have gone into that question carefully. The strength of the Tunnel is enormous; in fact, much stronger than tunnels are now made.

576. Has the Tunnel shown any indications of giving way in any portion of it, or is it still watertight?
It never was watertight; there has always been weeping from it. One pump is employed in working two hours a day.

577. Seeing that a percolation now takes place, is there no danger that it may ultimately weaken the work, so as to interfere with the working of trains through it?
I think not the slightest; it is one mass of solid work.

578. Earl of *Romney.*] What is the weeping owing to?
I suppose some crevices must have been left in the construction.

579. Colonel *Wilson Patten.*] Are the Thames Tunnel Company at all united in this scheme with you?
It originated with the Thames Tunnel Company. They are the promoters, in fact, of the line, although they could not, as the Thames Tunnel Company, put it forward in that name; it is, in fact, Thames Tunnel.

580. So that, in fact, you would be able to avail yourselves of the Thames Tunnel at little or no cost?
We have entered into an arrangement with the Government for the purchase of it.

581. Lord *Stanley.*] In short, one principal object of your scheme is to utilize the Thames Tunnel, which is of no use at present?
Yes.

582. Mr. *Milner Gibson.*] We have been told that a considerable number of persons pass through the Tunnel, whether they go through out of curiosity or go backwards and forwards to their work. If you purchase the Thames Tunnel, would the use of it to such persons be discontinued?
There is a clause in the Bill that special trains shall be run through the Tunnel for the accommodation of persons who may happen to use the Tunnel now, carrying them through at the same charge as is at present charged; but I think the majority of people who go through the Tunnel at present are merely visitors. This Plan shows the proposed junction in Liverpool-street (*producing the Plan*); the North London Line is this line (*pointing it out*); this is the ground purchased by the North London Company. We propose that our line should form a junction round there, and that the Great Eastern should, instead of coming down to there, form a junction with us on the high level; all these lines are on the high level.

583. You cross Bishopsgate-street on a high level?
Both on a high and a low level; it gives the Great Eastern an opportunity of running traffic through there. A new road would be made between the two stations; Liverpool-street would be widened.

584. Lord *Stanley* of Alderley.] You would get a communication on a level with the Metropolitan, with the North London, and with the Great Eastern?
Yes; that would give great station accommodation; this has been assented to by the London and North Western Company.

585. Earl of *Romney.*] What is the estimate of the cost of getting through the Thames Tunnel?
We have not made a separate estimate for that. We also effect a junction with the Blackwall Line, though, physically, we do not join the Blackwall; we make a junction with that branch of it which is London and North Western; we bring the blue line over this low-level line to this high-level line.

The Witness is directed to withdraw.

Peter Bruff, Esq.

18th Feb. 1864.

PETER BRUFF, Esquire; Examined.

586. *Chairman.*] YOU represent the London Main Trunk Underground Railway?

I am the Engineer of it.

587. Will you state the character of the line?

I will state shortly my connexion with the line, which will naturally lead to the principles which have guided me in laying it out. For the last 20 years I have been engaged in the Railway interest in the eastern part of England, and for many years was connected with the Great Eastern Railway (at that time the Eastern Counties), for whose system I was Engineer. While in that capacity, the want of a better metropolitan station naturally forced itself upon my attention. For many years I gave that subject consideration; but the Company, being split up into sections at that time, were not in a position to advance further into London. The extension of the London and North Western to Liverpool-street having formed a bar to the direct extension of the Eastern Counties Line further into London towards the west, my attention was directed to a mode by which improved communication with the City could be established near to Aldgate, and the line put into connexion with the Metropolitan, which was then making its way towards that part of the City. Having experienced the necessity which the Great Eastern were under, by the junction of their two main lines at Stratford as they approached London, of providing additional accommodation, the subject also forced itself upon my attention whether it would be better to quadruple their line by widening above ground at great cost, or provide an additional route, and so effect a City communication for the Great Eastern and, at the same time, establish an east and west communication by a junction with the Metropolitan at Finsbury. I therefore went so far back on the Great Eastern as to allow of their undertaking being quadrupled from Stratford to about a mile on the London side, and from that point I laid down a line to pass parallel with their undertaking for a short distance, then to diverge into the great main eastern road at Mile End, and from thence to utilise that wide approach into London by forming a railway beneath it. Of necessity, until that road was approached, the line would have to be formed above-ground, and that compelled the laying-out of the line with the gradients and curves adopted. Proceeding by the Mile End and Whitechapel Roads, the line gets within the confines of the City at Aldgate; and knowing by experience the fearful block that constantly takes place in the City communications from the want of an adequate thoroughfare from Whitechapel Road towards Finsbury Circus, I placed the line so as to accomplish two objects by one operation—that is, by removing one side of Houndsditch, and forming the line upon the site of the removed houses, I should effect the widening of a thoroughfare and the construction of a railway at the same time. I propose doing the same with Liverpool-street, which is almost continuous with it, and by that means—removing the sides of those two streets, and straightening and widening them—the line from the Great Eastern will be brought to the junction with the Metropolitan at Finsbury Circus, entirely under public thoroughfares either existing or to be widened or formed. By that means an east and west communication would be established through the Metropolis, and two main thoroughfares vastly improved for the traffic which now requires that facility. I had arrived at that position when the Report of your Lordships' House pointed out the necessity of a general combination for freeing the streets of the City from the enormous traffic which has long crowded them; and, after considerable deliberation, it appears to me that upon the original plan which I had formed in connexion with the Great Eastern, might very properly be engrafted the views expressed in the Report of your Lordships' Committee. And continuing the same principle of widening streets for the purpose of forming basements for railway construction, I have laid down lines making a complete circuit of the City, which, when completed, will be entirely under thoroughfares. I should state at the same time, the enormous traffic from the Docks and the waterside premises in connexion with the Blackwall Railway rendered it necessary to make some provision for that; which I have endeavoured to carry out upon the same plan, by the widening of Eastcheap and Tower-street, and effecting a new communication on to Tower-hill, under which the railway would be formed—being carried underground as far

far as the Minories, and from thence ascending joins the London and Blackwall, where the London and St. Katharine's Docks Branch unites with it. I have omitted, in order, rather an important feature. I stated that the project for connecting the Great Eastern with the Metropolitan was to be by Houndsditch and Liverpool-street to Finsbury Circus. When I conceived that it would be proper to make that route part of the general communication for London, I laid down a second line by the side of it, passing down as far as Aldgate; so that, in the event of the Great Eastern using the Finsbury Station for their general London traffic, there would be a quadruple line which would allow of their traffic passing up to that point without interfering with the local circuit. From Fenchurch-street the line passes diagonally to Eastcheap, in the direction in which I have since understood the Corporation have long had under contemplation the propriety of making a street, almost upon the identical site; so that with their co-operation, if that public necessity was fulfilled, that part also would be under a public thoroughfare. The line then passes along Cannon-street as far as Earl-street, and diverges in the direction of where the Mansion House new street is to be formed, continuing underground as far as it can be well placed; and from a point near Doctors' Commons it rises right and left to effect a junction with the London, Chatham, and Dover Railway, which it does on the south side of Ludgate-hill on the one hand, and at the foreshore of the Thames on the other. By the connexion with Ludgate-hill, a complete circuit of the City would be effected without materially interfering with or destroying property. A communication also would be established between the Southern Lines, the Great Eastern system, and the eastern parts of London. A short junction is also proposed to be established with the Cannon-street Station, that may be utilised, I think, to a great extent hereafter. But throughout I have been guided mainly by the necessity of utilising existing facilities, and limiting the expenditure as much as possible; and that has, in a great measure, guided me in combining street improvements with the formation of railways, expecting (as I believe will be the case should the measure proceed) that the Corporation will lend material assistance towards carrying out the plans of this Company. Referring to the observation I made as to the necessity of economy in dealing with this great subject, the curves and gradients at the junctions in passing from the underground to the above-ground lines may all be materially improved; so that, by some additional outlay, all those features to which Colonel Yolland has properly called attention may be rendered unobjectionable. An extension was embodied in the deposited Plans from the Mansion House-street to Westminster, with the ultimate intention of effecting a junction with the Victoria-street Station; but, in consequence of the difficulties that pressed upon the promoters with reference to it, there being so many competitors for the same ground, the Company withdrew that part of their undertaking.

588. Colonel *Wilson Patten.*] You say that you have suggested this line from your former connexion with the Great Eastern Company; do the Great Eastern Company take any part in it now?

Not directly. I attended before the Board in reference to the undertaking, and they were unanimous in their approval of it so far as regards placing them in communication with the City. With reference to the metropolitan-circuit part of it, they gave no opinion.

589. Mr. *Massey.*] Do they subscribe to it?

They are not subscribers at the present time; the alleged reason was that the particulars of the undertaking had not been sufficiently before them in time to enable them to take any part in it.

590. Lord *Stanley* of Alderley.] What is the estimate for the whole of this scheme?

£. 1,500,000.

591. Lord *Stanley.*] Including all the branches?

Yes.

The Witness is directed to withdraw.

T. Paine, Esq.

18th Feb. 1864.

THOMAS PAINE, Esquire; Examined.

592. *Chairman.*] YOU represent the North London Railway Company?
I am their Solicitor.

593. Would you state the character of their proposed schemes?
The Kingsland and Tottenham is a short suburban line, intended to provide for suburban traffic in the northern suburbs of London.

594. Lord *Redesdale.*] Is it in competition with some of the proposed lines of the Great Eastern Company?

Yes. There was an agreement between the Great Eastern and North London, which was inserted in the Bill of the Great Eastern Company last year which was lost, and by which agreement, in fact, the North London were to have half the traffic to Tottenham. We have been unable to come to terms this year with the Great Eastern Company, but have been willing, and are still, to come to an arrangement with them upon a similar footing to last year's agreement, as far as practicable under the altered circumstances.

595. Lord *Stanley* of Alderley.] It is almost entirely out of the metropolitan district?
Yes, very nearly. From Liverpool-street it is nearly straight north.

596. Colonel *Wilson Patten.*] You are an existing Company?
Yes, the North London Company; it has been in existence 15 or 16 years; we carry 8,000,000 of persons per annum, and we are making the Liverpool-street Extension in connexion with the London and North Western, in order to save the present circuitous route. There is another Bill of the North London referred to the Committee, the North London Additional Powers, which is not one for making a railway at all.

The Witness is directed to withdraw.

W. B. Lewis, Esq.

WILLIAM BOURNE LEWIS, Esquire, Examined.

597. *Chairman.*] YOU represent the Walthamstow, Clapton and City Railway?
I am the Engineer to the Railway.

598. Will you state the character of it?
The Bill seeks for powers to construct a line from Epping Forest and Walthamstow to the north end of the Liverpool-street Branch of the North London Railway. This is a suburban railway. The North London Tottenham Bill, and our Bill together, accommodate the district; we are in the same interest. The Walthamstow people wish to make the nearest line they can to the City.

599. Colonel *Wilson Patten.*] Has a Company been formed for that purpose alone?
Yes. Here is the prospectus with the names of the promoters, who are all residents of the neighbourhood.

600. What is the estimate for the line?
£. 200,000.

601. Mr. *Milner Gibson.*] You propose to have running powers over the North London Line?
Yes; or they would work us by some arrangement.

The Witness is directed to withdraw.

Ordered, that the Committee be adjourned till To-morrow, Twelve o'clock.

Die Veneris, 19° *Februarii* 1864.

PRESENT:

The Lord PRESIDENT.	Mr. MILNER GIBSON.
Earl of ROMNEY.	Lord STANLEY.
Viscount EVERSLEY.	Mr. MASSEY.
Lord REDESDALE.	Colonel WILSON PATTEN.
Lord STANLEY of Alderley.	Mr. HERBERT.

THE LORD PRESIDENT, in the Chair.

Evidence on Railway Schemes (Metropolis).

J. W. Bazalgette, Esq.

19th Feb. 1864.

JOSEPH WILLIAM BAZALGETTE, Esquire; Examined.

602. *Chairman.*] YOU are Engineer to the Metropolitan Board of Works? Yes.

603. We know, from the Report which we have received, that you have given great attention to this subject on behalf of the Board of which you are engineer; will you state, generally, to the Committee, the substance of that Report?

The Report goes into detail upon each of the schemes, showing the manner in which they affect the drainage, and the streets crossed by them; the general view taken in the Report is that the railways, as laid down, unnecessarily cut up the sewers, and that the provisions for bridges in the cases of those lines which pass over the streets are insufficient, and that there should be some considerable alterations in those respects. I would take, for instance, the lines running from the Thames Embankment, east and west, through Pimlico and Belgravia; those lines, all of them, cut up the sewerage to such an extent that it would probably require works as large as the railways themselves, or even larger, to remodel the sewerage; I think that those lines, if constructed from 10 to 15 feet deeper, might probably pass under the sewers with advantage to the railways, for I think that they would then get down to the clay, and would be constructed in a better soil.

604. What is the character of the soil through which they pass, according to their present levels?

The character of the soil through which they would pass would be to a large extent alluvial deposit in that particular locality.

605. Lord *Redesdale.*] It is a porous gravel, full of tidal water at times, is not it?

Yes; it is, and in some cases in peat and running sand. From having constructed deep lines of sewers in that route, I know that they would encounter great difficulty; and I think that by going deeper, they could get out of that difficulty to a great extent. Then the difficulty would be, how would you drain the railway? I think that that might be done by carrying a line of sewer for the drainage of the railway to one of our pumping stations.

606. Lord *Stanley* of Alderley.] What is the extent of district in which you consider the ground is of the character that you have described?

All through Westminster.

607. From Brompton to Westminster?

All through Victoria-street to the Thames Embankment, and I think it would extend further.

J. W. Bazalgette, Esq.

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608. Lord *Redesdale.*] Would the sinking of the lines the number of feet you mention enable the companies in all cases to take their railways below the sewer, giving them sufficient headway?

Yes: the depth of 10, or possibly 15 feet would enable them to get under the deep sewers.

609. Then how would they manage in passing along the Thames Embankment? Would you make them keep at the same depth there?

No; the levels are pretty well managed upon the Thames Embankment, so that the sewer could be carried under the railways.

610. They would have to rise to the Embankment?

Yes.

611. The rise would be a very rapid one if they are to be under the main sewer in the Broad Sanctuary, and to come just below the level of the embankment at Westminster Bridge, would it not?

I think that is not necessary. The sewer in the Broad Sanctuary passes along Parliament-street, and would run by the side of the railway; they would run parallel.

612. Some of the railways are laid down; are they not?—to pass on the south side of the sewer?

Yes; in that case the sewer would still continue north of them as they came to the embankment, and would not cross them; it would pass up Parliament-street to Whitehall.

613. *Chairman.*] Did any of the promoters of these railways put themselves in communication with the Board of Works, or with yourself, with regard to the lines?

Many of them applied for information as to the levels of the sewers.

614. You had no means of communicating your ideas to them, with respect to their schemes?

No; I supplied them with every information asked for; they sent their draughtsmen and clerks to copy the plans.

615. Lord *Stanley* of Alderley.] Would the construction of any of the railways along the Thames Embankment interfere with your sewers?

The railway could be constructed under the Thames Embankment, and the sewers carried under the railway.

616. You do not think that the sewers could be constructed parallel with the railway, and nearly upon the same level?

The low level intercepting sewer, would run parallel with the railway, but at a lower level, so that the railway could be drained into it.

617. So far as regards the construction of a railway along the Thames Embankment, it would not injuriously interfere with the system of sewers?

No, it need not if properly made.

618. With regard to the proposed extension beyond Blackfriars Bridge up to the City, would the construction of railways in that locality injuriously interfere with the system of drainage in the City?

The continuation of a line from the Thames Embankment along the new street would be a difficult work; it would be necessary there that the railway, the subway (for there is to be a subway for gaspipes and waterpipes), and the sewer should be all designed and constructed in one work together. There is no room to spare, the road being only 70 feet wide; it would be necessary to have cellars to those houses, and there would be barely space to construct a double line with a subway and a sewer, and to make the connexions underneath; but it could be done. With respect to the sewers generally in the City, they would be cut up by the underground lines a good deal, but most of the lines of railway are above the low level intercepting sewer, so that the sewers could be reconstructed with a fall into that sewer; it is only a question of cost.

619. In any further extension of the scheme of railways beyond the new street up to Fenchurch-street, or in that direction, would that portion of the line be liable to much objection on account of interference with the sewers, or would the

the objection you mentioned, with respect to the sewer in the new street, apply also to a line in that direction?

I should state that the sewers to which you now refer are under the jurisdiction of the City; but at the same time I am aware, whilst the sewers would be cut up to a large extent, it is possible to re-construct them into our intercepting sewer.

620. Lord *Redesdale.*] The portion of railways to which you raise the greatest objection is that from the Thames Embankment up towards Brompton?

Yes; the objections there are the most serious.

621. What other lines are there that seriously, and, in your opinion, unnecessarily interfere with the sewers?

I think that of the three lines from the Charing Cross Railway to the stations of the northern lines, two unnecessarily interfere with the sewers; by an alteration of the levels of the railways they might be improved.

622. Mr. *Herbert.*] Which are those two lines?

The yellow and the green on the large map on the wall. This (the Hampstead, North Western and Charing Cross) is a deeper line.

623. *Chairman.*] Are there any of the lines which come north and south, which you consider do not interfere with the sewers?

The line to which I have referred does not interfere seriously with the sewers; namely, the Hampstead, North Western, and Charing Cross Railway; it is constructed deeper than the others, and is mostly below the sewers.

624. You stated that you would prefer the railways being made on such a level as would enable them to go underneath the sewers. Supposing there were found to be difficulties in adopting such a course, and the railways were to be constructed as proposed, would the interference with the sewers be permanent, or would there be merely great inconvenience during the progress of the works?

What I have been alluding to, is a permanent objection.

625. Lord *Redesdale.*] You think it very difficult to carry out an efficient system of sewerage, with the interference proposed by those lines?

I do with those lines I have referred to.

626. Mr. *Massey.*] The Hampstead, Midland, North Western, and Charing Cross Railway Company propose to construct a roadway in connexion with their line?

Yes.

627. Is that a necessary part of their scheme?

I apprehend not; it is the best part of their scheme as regards the public.

628. Do the whole of their line go underground, under the new roadway?

Yes, the new roadway would be over it; it would, however, be more costly to them to construct the roadway; therefore, probably, they would not do so unless they were obliged.

629. The roadway would involve the destruction of property, and interference with trade?

Yes, but the line goes through bad property, and it is so far a great improvement to London.

630. Earl of *Romney.*] It would be a great improvement to the metropolis, quite independently of the railway?

Yes.

631. Mr. *Herbert.*] Would your suggestion of making the railways 15 feet deeper than now proposed, add enormously to the expense?

I think not.

632. Lord *Redesdale.*] You think that by getting down into the clay, they would have a better soil to work in?

I think by doing that they might tunnel to a large extent, and so not create an annoyance whilst they were being constructed; and that they might so construct the lines quite as cheaply, or possibly more cheaply.

633. In what lengths of tunnelling have you been able to construct the sewer?

We have shafts generally 300 feet apart.

J. W. Bazalgette, Esq.

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634. You do not think that the work can be economically carried out at longer distances?

It would be very slow at longer distances. The greater the number of shafts, the greater the number of men that can work at each face. If stations were not required where the railway was passing the deep sewer, the line could possibly be made to rise to a higher level; that is to say, they might depress the line at those points and rise again.

635. Lord *Stanley* of Alderley.] It would be essential for that deep line of railway to have a separate system of sewers to drain the railway?

It would. I alluded very briefly just now to the interference by railways passing above the ground with the roads, but I conceive that to be a very important point; if we get a large number of railway bridges with brick abutments in front of the general line of frontage of the houses of the streets, that will prevent the future improvement of those streets, and will render them very unsightly for ever.

636. Are there many of the railways proposed to be carried above ground?

A large number of them are proposed to be over-ground.

637. Lord *Redesdale.*] Is there any sightly railway bridge over a street to be seen in the metropolis?

I am afraid there is not.

638. Lord *Eversley.*] Are they built with iron girders?

Yes.

639. Lord *Redesdale.*] Have you any suggestion to make as to how those bridges might be improved, with a view to rendering them more sightly?

I think those bridges might be improved even though constructed as they are now with iron girders; but my observations at this moment are rather turned to having the span, and height of them sufficient. I think that no existing road should be narrowed at all. For two years we tried to get clauses inserted in the Bills for new lines, giving the Board of Works power to control the span of bridges. We were opposed, and successfully opposed, the first year by the railway companies. Last year we got clauses in, providing that if the Board of Works and the railway companies could not agree upon the spans, they should refer them to arbitration; and we have had one or two arbitrations under those clauses, and we have got some of the bridges improved a good deal, but not as good as they ought to be.

640. Lord *Redesdale.*] What is the narrowest span you would recommend to be adopted?

The Board of Works have determined that no new street shall be laid out of less width than 40 feet; therefore, I would begin by saying that no railway carrying a bridge over a street within the metropolis should have a less span than 40 feet; but where the street is wider than 40 feet, the bridge should be the full width of the street; and in those cases, where there are gardens and forecourts in front of the houses and a road between, if it is too wide to have a bridge in one span, it should be divided into three, and there should be no solid structure in front of the line of houses; it interferes with the light and the air; it interferes with the appearance of the street, and is a permanent injury to the locality.

641. *Chairman.*] Have you read the evidence given by Mr. Hawkshaw last year before the Committee of the House of Lords, with regard to the great difficulty that engineers have in producing anything at all tolerable in architectural effect, in consequence of the different requirements they are obliged to meet?

No; I do not remember that. In the Old Kent-road we have just got the South Eastern Railway Company, who have had to submit designs to the Metropolitan Board of Works before they could construct their bridge, greatly to improve that bridge. They submitted two or three, and we required them to enlarge their spans. We got, not all we required, but some modification of what they proposed. Then, to save going to arbitration, they were disposed to meet us; and instead of constructing the bridge with solid brick abutments running in front of the road, and with a height of only 16 feet, which height is insufficient for main roads (for several of the existing bridges have had hop waggons and waggons with empty casks stick underneath them), we got them to

to raise the span in the centre of the road, and to give three spans with iron columns between them, which was a very great improvement. *J. W. Bazalgette, Esq.*

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642. Lord *Stanley* of Alderley.] What is the least elevation at which you think those bridges ought to be across roads?

Upon a main road, 18 feet.

643. You think that that would enable heavily loaded waggons to pass under?

Yes. And with regard to the appearance of the bridges, those requirements would certainly tend to improve the architectural appearance. The increased height and the increased span must produce a better design. At present, railway companies appear to have gone on the principle of marking upon their plans and sections the minimum height and span sanctioned by Parliament; and the approaches, where they alter the roads, are made in conformity with the existing Standing Orders, which, I apprehend, had reference to roads in the country, those requirements would be sufficient for roads in the country, but they are not sufficient for streets. Railway Companies propose to alter some of the streets to an inclination of 1 in 20 and 1 in 30. I think that in streets they ought not to be less than 1 in 40, or 1 in 50.

644. I think, in your Report, you recommend that those provisions should be settled by the Metropolitan Board of Works, and that there should be a Standing Order to meet the exigencies of the case?

I have suggested that. I think if Parliament should sanction a particular line as being good in the main, they might refer it back to have the levels and other details altered, and that it should be submitted to them again after a conference with the Board of Works.

645. Lord *Stanley* of Alderley.] Would not the conditions which you would require, in many instances, increase the cost of the construction of the railway?

Clearly; what I propose for bridges would increase the cost of the construction of the railway.

646. Would not it only increase the cost of the construction of the bridge itself, but by requiring them to go at a higher elevation, derange the principle upon which it is to be constructed?

The difference in that respect could not be great, because Parliament now requires them to have 16 feet headway. It would only be making them go two feet higher. It would add something to the cost, but not much.

647. They might descend on either side so as not materially to interfere with the level of their railway?

Yes.

648. *Chairman.*] You would prefer that being done by the Promoters and the Board of Works coming to an arrangement in each individual case, rather than laying down any general principle different to that which applies to railways throughout the country generally?

Yes; I think that would be better, perhaps. There must be exceptions to every rule; but I think that the suggestions which I have made would apply very generally.

649. Lord *Redesdale.*] You are aware that all the regulations with regard to the inclinations of roads and bridges are settled by the Railways Clauses Consolidation Act?

Yes.

650. Do not you find that railways, in dealing with the Metropolitan Board of Works, plead the Public Act as a reason why they should not be required to give more accommodation with regard to the width, height, gradient, or otherwise, than that which is required by that Act?

That is so.

651. Do not you think, therefore, that there is a necessity for a Railway Clauses Act for the Metropolis?

I think there is a very strong necessity for that. If the present state of things is to continue, London would be ruined instead of improved.

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652. Mr. *Milner Gibson.*] Do you think that we have sufficient knowledge and experience of what is required; in the case of Metropolitan Railways, to provide general clauses that might be incorporated into every Bill?
I think we have.

653. Lord *Stanley* of Alderley.] Do you think that general requirements would be applicable to the cases of all railways in the Metropolis?
There might be exceptions; and these might be met by a clause that the Company should be permitted, with the sanction of the Board of Works, tomodify the works in exceptional cases. Cases will arise in the construction of works which you cannot foresee in any general legislation.

654. Lord *Redesdale.*] You are aware that, without any such clause, there are in numerous Railway Bills every Session exceptional cases with regard to the span of arches, the height of arches, and the level of roads, for which powers are sought to be taken by Promoters of Bills?
Yes.

655. And those are inquired into by the Board of Trade, and the report of the Board of Trade is sent to the several Committees upon the Bills?
Yes.

656. And after hearing the evidence on the one side and on the other, the Committees are able to determine whether there is any ground for a relaxation of the extreme requirements of the public law?
I am aware of that; I think that it would be an advantage if, in the case of any proposal coming before a Committee, the Committee could be informed of any contemplated street improvements in the neighbourhood.

657. Would it not be in the power of the Board of Works to show the Committee contemplated improvements?
Yes.

658. You do not mean that, in the case of some improvement so very prospective that it would not be possible to show any real grounds for supposing that it would take place, there should be then requirements imposed in view of that improvement?
There are many large improvements proposed for the metropolis which cannot probably be carried out for some years, for want of funds; and if a good improvement could be shown to the Committee which might be carried out some years hence, that would be a very strong ground for imposing conditions on the Promoters of any undertaking that would interfere with it.

659. Colonel *Wilson Patten.*] Do any of the railways now in contemplation interfere materially with the improvements of the metropolis as laid out by the Board of Works?
I think that a large number of them would very seriously injure the existing streets of the metropolis.

660. Will you point out where they interfere most with the great communications east and west?
I do not know that I can point out the extreme cases without having looked them up first.

661. Would any of them, if constructed, altogether prevent the Board of Works from carrying out improvements which they have in contemplation?
No; they would not altogether prevent them, but they would add very much to the cost of those improvements.

662. Mr. *Massey.*] Your attention has been particularly directed to these schemes as affecting the sewage?
Yes; and the streets also.

663. Lord *Redesdale.*] Have the Board of Works ever thought of any general improvement in the way of street accommodation, and particularly in the way of more direct communication with the several metropolitan railway stations?
Not particularly with regard to communication with the several metropolitan railway stations; but they have had before them for consideration a very large number of proposed street improvements in various parts of the metropolis.

664. Are

664. Are those improvements of an important character, or are they improvements in the way of widening a street here and there a little, and obtaining some convenience from that, but still not affording any general improvement in the communication?

They have been generally in the way of improving existing thoroughfares.

665. Do you not think that it would be desirable for the convenience of the Metropolis to have as direct communication by wide streets with the several important railway stations as could be possibly secured?

I do.

666. Do you think that it would be within the limits of those powers which are put at the disposal of the Metropolitan Board of Works, to undertake the construction of streets of that character?

I think that it is quite within their powers, but they have not at present the funds.

667. Colonel *Wilson Patten.*] Have any of the improvements hitherto made by the Metropolitan Board of Works had reference to the improved approach to the great railway stations?

Yes; New Southwark-street has that object mainly in view. It is a communication to the London Bridge Station; it makes a complete line from Westminster Bridge to London Bridge.

668. Have any of the street improvements north of the Thames had that object in view?

No; the streets which have been completed on the north side, have not been made with that object.

669. Lord *Redesdale.*] In making that street in Southwark, has the expense been very considerable, or has the increased value which has been given to the ground by the improvement in the locality, enabling you to sell the ground at a greater price than it was purchased at, at all covered the expense?

It has not covered the expense; but it has realised more money than was anticipated in the first instance would be realised, and therefore the cost has been less than was estimated.

670. What will that street cost?

I cannot give the figures.

671. Mr. *Massey.*] What is the length of that street?

Three quarters of a mile.

672. Lord *Stanley* of Alderley.] Are you aware of cases in which the improved value given to the ground by new street improvements has nearly repaid the expense of the construction of the street?

No; I think that has never been the case in the formation of any street.

673. Has not that been the case in some of the street improvements in Paris?

In some instances, where I have had an opportunity of inquiring, I have found that we have made improvements at a less cost than they have done in Paris; I think that they are exceptional cases only in which Paris improvements have been remunerative. For though you buy bad property for the formation of the street, you buy it compulsorily, and thus you are obliged to pay a great deal more for it than its actual value. Then you devote the greater portion of that space to the public; and though you sell the improved frontage on either side, that will not repay the sum which you have paid for compulsory purchase and for the portion which you have laid waste for the street.

674. Viscount *Eversley.*] The line of street which you have alluded to, from Westminster Bridge to London Bridge, is crossed in many places by these railways?

Yes; in three places.

675. In all those cases are the railway bridges too narrow?

No; in those cases they are the full width of the street.

676. Have you heard complaints made on the part of the inhabitants whose houses adjoin those iron bridges, of the great noise caused by them?

Yes, that is generally complained of; not only by the inhabitants, but by persons driving underneath such bridges.

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677. It would be a great improvement if those bridges could be constructed of stone or brick, would it not?

I do not think they could be constructed of stone or brick where they are tied to a low headway, and a large span, iron is almost the only structure that will answer; but they may do a great deal towards improving the construction. That is one of the points which I have alluded to in my report; that they may make them less noisy and water-tight. There are several points of that kind which require attention. I think that railways passing under streets might be covered for some distance from the street, so that an engine passing along may not come suddenly upon the street, throwing its steam and noise over the street, and frightening the horses.

678. Lord *Redesdale.*] Would not a new street from the lower end of Leicester-square to St. Martin's-lane afford very great facilities for the very crowded approach which there must hereafter be to the Charing Cross Railway?

Yes; I think that that would be a great improvement.

679. The distance is not long there?

No.

680. And the houses are of a poor character?

They are.

681. Earl of *Romney.*] Which do you think would afford the most convenience to the public within the Metropolis—a very much improved system of roads, or railroads?

The convenience would be of a different character in the two cases. The connecting of railways would be rather for passengers passing through London from the country, or for minerals; the improved roads would be rather for persons living in London; and I think that my answer could not be general—it would depend upon the particular locality, and the distance which you have to travel.

682. Take the inner circle?

I think that an inner circle would be very useful to passengers living in London.

683. For the convenience of persons living within the inner circle, would it be more convenient to make better roads within the circle, or to have railroads running through it?

I can hardly answer that question without having before my mind some particular street improvement, and regarding the localities round it; but it occurs to me that the completion of that inner circuit would be a very great advantage, so much having been already finished.

684. Colonel *Wilson Patten.*] Are you in your present office able to judge of the requirements of locomotion as regards the operative classes?

Yes.

685. Do you believe that there is a greater necessity now than there used to be for finding residences for those operative classes outside the Metropolis?

I do; much greater.

686. Do you believe that it is possible to establish any means of communication by railway, by which those classes could be enabled to inhabit the suburbs and come to their work in the City?

I do; and I think that it is very desirable.

The Witness is directed to withdraw.

WILLIAM HAYWOOD, Esquire; Examined.

W. Haywood, Esq.

687. *Chairman.*] WILL you state to the Committee the position you hold in connexion with the City of London?

I am the engineer to the Commissioners of Sewers, which Commission is a section of the Corporation, and has the charge of the sewers, and roads, and all matters in connexion therewith.

688. In

688. In that capacity you have reported to the Corporation your views with respect to the proposed railways which affect the City?
Upon those which directly affect the City.

689. Which of those railways do you consider seriously objectionable?
The whole of them interfere with the sewers; the whole of them would seriously interfere with the traffic; and the whole of them would seriously disturb the business affairs of the City.

690. Do you mean that that would be the case during the time of their construction, or permanently?
During the time of their construction only. Permanently—one or two of them in part, if not in the whole, of their plans, would be, in my opinion, of very great benefit to the City.

691. Lord *Stanley* of Alderley.] Which of those would you consider would be of permanent benefit?
I would rather, if you would permit me, deal with general principles than with any particular railway, because I am not prepared to advocate any one railway, without much further investigation.

692. *Chairman.*] What are the general principles which you think ought to guide Parliament with reference to the construction of railways within the City?
To begin with, I think that diffusion, and not concentration of the traffic, is the first principle to be laid down; that numerous stations in all parts of the City, and indeed all parts of London, should be constructed, and that a complete system of intercommunication between all the lines affecting the Metropolis should be established.

693. Mr. *Milner Gibson.*] Do you mean by junctions?
I mean that a man getting in at one part of the Metropolis should be able to proceed to any other part of the Metropolis without leaving the system of railways. These railways, I apprehend, are laid out to relieve the streets of the present traffic and to provide for the future increase of traffic. Now, the streets will not be effectually relieved in the most crowded parts if a man has to take a vehicle to get from one station to another within it, but they would be relieved if a man could get into a station at the west end of the town and get out at a station at the east end of the town if he so desired it; or if, when he got in at the west, or any part of the town, he was able to go east, west, north or south, without leaving the railways; but if he has to come to the surface or leave one railway at any point and take a vehicle to any other railway to proceed to the end of his journey, there would not be that large relief in the street traffic, which is desirable, and which can perfectly well be accomplished under a proper system.

694. You are speaking now exclusively of Metropolitan communication?
Yes; I am speaking of a system of railways for Metropolitans.

695. Having nothing to do with suburban or long passengers?
I include suburbans in the term Metropolitans.

696. *Chairman.*] How do you propose to solve the problem of affording the public improved Metropolitan railway communication, without causing temporary inconvenience to the crowded parts of the Metropolis?
It is utterly impossible to do it without causing temporary inconvenience; but, at the present moment, the traffic causes permanent inconvenience, and an increasing inconvenience.

697. Lord *Stanley.*] You look upon the present overcrowding of the City, which you assume cannot be relieved to any considerable degree by new streets, as quite as great an evil as a temporary interruption by the making of new lines?
I do; but I do not say new streets will not relieve it, although considering that the population of London doubles itself in 37 years, and that the necessity for vehicular transit increases in a much larger ratio than the population, I can conceive no means of satisfying the ultimate necessities of London in respect of transit without railways. New streets would certainly go a long way towards it for a time, but I am at a loss to know where the funds are to come from for new streets. A new street in the more crowded parts of the Metropolis would cost a million a mile, and under the present municipal arrangements in the Metropolis, it is difficult to say where the funds could come from for even a single mile of such a street.

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698. The advantage of a railway pecuniarily being this, that inasmuch as they have a monopoly of conveyance upon the line constructed, the line itself is constructed at no public cost?

Exactly; but I think that, even supposing several miles of new street were constructed (and I think the construction necessary under any probable extension of railways), railway accommodation for the Metropolis would be still necessary. As the population increases it fills the further outlying district; at this present time building is going on, and suburban area is covered and occupied probably at the rate of two square miles per annum. Within a certain radius of the commercial centre (which is the City) the population is probably as dense as it may ever be expected to be. Now that radius is from three to four miles from the City, but the increase in the population is filling the outer circle beyond the radius I have just named, and the distance between people's homes and the City becomes and will become so great that railways, I think, are the only means of enabling them to come to and from their business.

699. Earl of *Romney*.] That being your opinion, though a temporary evil would be likely to be caused by the construction of those railways, you would consider that the evil should be faced?

I look upon a large extension of purely Metropolitan railways as inevitable.

700. You do not object to Metropolitan railway communication?

No; and I do not object to some portions of some of the railways projected; on the contrary, I think some particularly valuable.

701. Mr. *Milner Gibson*.] You consider it important that a person getting into a railway in one part of London should be delivered at his destination without any change?

Without leaving the system of railways, I do not wish to be understood as meaning that he should not change his carriage; probably that would be a necessity in some cases, but that he should not leave the system of railways until he arrived at the station nearest to his destination.

702. Supposing a suburban arrived in London, you think he ought to be carried on, whether to the West End, or to the City, or the north, or wherever he may wish to go by a continuous railway?

Yes; what practically might be regarded as a continuous railway.

703. You would not need a junction if the suburban railway came into close contact with the purely Metropolitan one. Would that change, do you think, operate to prevent people availing themselves of the Metropolitan one?

By no means; it might be arranged that the trains should meet each other almost at the same moment, and exchange passengers. Supposing the stations were in juxtaposition, and on the same level, or nearly so, the passengers would be able to change in a short space of time. The system already is in operation in various parts of London.

704. The object is to save the necessity of having to walk from one station to another?

Yes, or to ride; but to substitute railway transit for vehicular transit entirely.

705. That object may be accomplished without having actual junctions?

Yes, without havingactual junctions; but it would be advisable that, where practicable, actual junctions should be made; for instance, at this present moment the Great Eastern terminates in Shoreditch; the Metropolitan Extension Railway will terminate in Moorgate-street. A suburban passenger coming up the Eastern Counties as far as to Shoreditch, and wishing to go, say to Farringdon-street, will either walk, or take a cab from the Eastern Counties Railway to the future Metropolitan Terminus at Moorgate-street. That I hold to be exceedingly undesirable, because, assuming him to take a cab, he would help to continue the excessive traffic which exists in the City between those two points; whereas, if there was a junction between the Metropolitan Extension and the Eastern Counties; or, as it has been just put, supposing the stations came immediately together, he would proceed directly without getting away from the railway system at all. So, again, if a man from Bow (I am confining myself entirely to the question of railways for the Metropolitans here, and not alluding to the long or national traffic; but speaking merely about Metropolitan traffic) desired to go to Clapham or Rotherhithe, if such a junction of such a combination as that were effected,

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he would come right over the junction line, and then on to the London, Chatham and Dover, and thence to his destination, and arrive there without getting out at all; that is the principle I would wish to see established.

706. Lord *Stanley* of Alderley.] You are engineer for the City sewers generally?
Yes.

707. Your attention has been called to the different lines which these companies propose to take through the Metropolis?
Yes.

708. Will you inform the Committee whether, with regard to the portion of the lines from Blackfriars Bridge to Cannon-street, there will be any material inconvenience or difficulty in the way of interference with the sewerage or interference with the traffic of the City?
While the work is in progress, there must be some interference with the traffic of the City; but, by proper regulations, there need not be such a serious evil as is anticipated, but if the railways are allowed to be constructed exactly in the way the Company think proper, I think the evil would be very great for the time being.

709. So far as the portion of railway along the new street goes, you do not think it would materially interfere with the sewerage or the traffic?
No; it might be constructed at the same time as the new street with little inconvenience.

710. Do you think there would be any inconvenience in the construction of a system of sewerage alongside of the railway?
With regard to most of the schemes it would be purely a question of expense; there would not be an ultimate permanent interference with the sewerage; a large portion would have to be re-constructed, no doubt, but there would be no difficulty in doing it.

711. Would that objection apply to the portion beyond Cannon-street as well as to the portion between Cannon-street and Blackfriars Bridge?
Yes.

712. Even there there are no insuperable difficulties in the way of the construction of railways so far as the sewerage is concerned?
No.

713. However great may be the objection as to the interference with the traffic where the lines cross King William-street and in the neighbourhood of Fenchurch-street?
There would be considerable interference while the works were going on. If it is done slowly that inconvenience may be very much reduced.

714. Then the difficulties which you anticipate, are not insuperable difficulties, but simply a question of cost; and the railways might, in your opinion, be constructed without materially interfering with the business of the City?
I think so.

715. *Chairman.*] Will you proceed with your statement as to the general principles which ought, in your opinion, to be borne in view in laying out railways in the Metropolis?
The system I would have laid out, would scarcely comprehend such a thing as a terminal station in the ordinary meaning of the term, because everybody would go to whatever part of London he wished by merely taking to rail at the station nearest to his own house, and therefore there would be no great aggregation of traffic at any one particular spot, the stations should be very numerous ones, probably not more than three-quarters of a mile, at the outside, from any man's door. Then, I think, those stations should not in any case be in large main thoroughfares, but immediately contiguous to them. I believe there will be an enormous traffic upon these Metropolitan lines; more than there ever has been upon any lines yet constructed, and therefore the trains must be very frequent; but I do not think great speed essential. The trains should run of course very early and very late; having regard to the interests of all classes, especially to the working classes, who are likely to live still further from the Metropolitan centre than they

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now do. I think that all lines should be, where practicable, subterranean; that great effort should be made to make them subterranean; and I think they can be made almost entirely so. I think, if railway bridges should be constructed across the river (as I believe ultimately some others must be constructed), that facilities for pedestrians to cross by means of those bridges should be enforced; that is, that the railway company should be bound to provide pedestrians the means of crossing the river, either for nothing or at a very low toll. It is a great pity that so many railway bridges have been already built across the river, without giving that facility to foot passengers. I think also lines of public way can be most advantageously used for the construction of railways, and that railways and new streets might be devised, so as to be constructed at the same time.

716. Lord *Stanley.*] The street being above, and the railway below?

Yes; I think also that in such a case the Corporation or the Metropolitan Board should have the means afforded them of contributing towards the cost of those streets. To throw the whole cost of constructing a new street simply as a street upon any corporation or municipal body, is a very different thing to halving it, or dividing it still lower with a railway company. Sometimes sums of half a million are obtainable, when twice or three times that amount cannot be obtained; the necessity for new streets, or for the widening of others in some parts, is very great. The whole question of the traffic of the Metropolis has been very much under my consideration, and, as an illustration of the necessity alluded to, I may inform you that there are now 700,000 persons coming to the City and leaving it daily. Policemen were stationed at particular spots, three years ago, to count the persons coming into the City, and they were found to be over 700,000. The largest number of those are persons who come from the suburbs, and it is in their interest that railways immediately communicating with the City are most urgently needed.

717. Lord *Stanley.*] Was the 700,000 the number of persons going one way?

Those who entered the City only.

718. So that that would give a million and a half both ways?

Yes; probably the same persons who came in would go out, or an equal number.

719. Colonel *Wilson Patten.*] Where were the persons stationed who made the observations?

They were stationed at the points where the City joins on to the county.

720. That being so, you would have to add to the number you have given all the interior locomotion?

All the residential population; but there is a probability that a proportion of the residential population may have gone out of the City during the day; still there is no doubt that there are not less than from half to three quarters of a million of people within the City alone during the busy hours of the day.

721. For what purpose was this calculation made?

I do not know; I first commenced taking observations of traffic 15 years ago. It was with the view of writing upon the wear and tear of the pavements under different conditions of traffic. I found it a matter of considerable interest, and though I have never written what I intended, yet from time to time, I have continued my observations upon the Metropolitan traffic, thinking the time would come when it would be a matter of considerable interest, and, perhaps, of some public importance, and because the subject had a bearing upon various professional studies.

722. Were those observations made on your own private account?

Mostly not; I employed the Commissioners' agents to make those which had a bearing upon their jurisdiction; they were not paid by me, but by the commission. I first commenced with the City; I then extended my observations from time to time to other parts of the Metropolis. From time to time I have also been examined before a large number of Committees of the Houses of Parliament upon Metropolitan matters, and on these occasions I have had to make special observations relating to the particular points upon which I was going to be examined, which observations I have collated from time to time, and I have them here, though not in a condensed form. Many years ago I was associated with Mr. Bazalgette, and before him with Mr. Frank Foster in the preparation

preparation of a scheme for the interception of sewage of the Metropolis. At that time all questions relating to the probable increase of population over purely suburban areas became a matter of actual investigation with me, so that my attention has been drawn to the special subject of population and traffic in a variety of ways and for various reasons.

723. What are the relative proportions of those who come into the City in vehicles, and those who come on foot?

They vary considerably; I find at Temple Bar, that the proportion of people in carriages (that is to say, any kind of horse conveyance) to those on foot, is about 1 to 3; at Smithfield Bars, it is 1 to 6; at Holborn Bars (there are very nearly as many come in carriages as go on foot), it is 1 to 1·15; at Blackfriars Bridge there is only one person in a carriage to 4·34 on foot; on London Bridge there is about 1 in a carriage to 1·76 on foot; in other cases it goes up as high as only 1 in a carriage to 7 or 8 on foot; but the mean of 11 important streets which I have examined, gives one person in a carriage to 2·42 on foot.

724. Lord *Stanley.*] Have you anything to show the increase of that traffic within the last 10 years?

I will give what the traffic on London Bridge was in 1850, in the 12 busy hours of the day, which are from eight in the morning to eight at night, and when the greatest pressure of traffic is felt.—In 1850 there were 13,099 carriages passed the bridge, that is, in both directions; half one way and half the other. In 1856 the number was 16,092. In February 1860 it was 15,408. I may here observe that the greatest pressure is between the months of March and September, and this applies to all main thoroughfares of the Metropolis. There is not so much traffic in the winter in any part of London. In 1862 it had got up to 19,698; and in June 1863 there were 20,405 vehicles passed over London Bridge in those 12 hours; therefore there is the difference between 13,000 in 1850 and 20,000 in the year 1863.

725. In round numbers, the traffic had increased in 13 years 50 per cent.?

Yes, on that line; but it had not increased so much as upon many other main thoroughfares; it has, however, increased in other cases, I should say, 30 to 40 per cent., and that in spite of all the new streets and all the increased accommodation afforded by railways.

726. Lord *Redesdale.*] Have you had any calculation made since the opening of the Charing Cross Railway?

No; that has only been opened two or three weeks. Streets in the metropolis which previously had no traffic, or next to no traffic, upon them, have now got a large traffic upon them, showing that the various railway termini to which they lead, especially those at the West End, must have materially prevented the increase which otherwise would have taken place in the City. For instance, there is Victoria-street, Westminster, which some years ago had not, I believe, a traffic of above 600 or 700 vehicles a day; it has now, something like 2,500 vehicles a day. The new street in Southwark, which was only opened about a fortnight ago, I find has a traffic of over 4,000 vehicles through it a day.

727. Mr. *Milner Gibson.*] Relieving very much the streets by the side?

One would think it ought, and undoubtedly it must; but apparently the traffic of all the main thoroughfaes, in spite of all the relief, goes on increasing very much in the same ratio as on London Bridge.

728. Mr. *Herbert.*] In those numbers which you gave us as those persons entering the City, do you count those who come in by steamers?

Yes, and by boats; in fact, by every inlet to the City.

729. *Chairman.*] You, acting under the authority of the corporation, placed persons so as entirely to surround the City, and count the number of persons coming in to it?

No; the general total of 700,000 was not arrived at by me, it was arrived at by the City police.

730. Colonel *Wilson Patten.*] By whose orders was it taken?

I am not aware; I have no doubt it was ordered by the Police Committee of the Corporation.

731. Lord *Stanley.*] Have you anything to show what is the direction in which that traffic mainly passes, whether north and south, or east and west?

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There are three or four important lines of traffic. There is the great line of traffic from the Chelsea, Kensington, and Brompton district coming along the Strand, and through the City, dropping nearly the largest portion of its traffic in the City, but picking up others and going quite to the east. Then there is another large line of traffic that comes to the City in the same direction, and goes towards London Bridge, and over London Bridge. Another large thread of traffic comes from the north-western portions of the Metropolis, and finds its way through Oxford-street into the City, and then goes to the east, a branch of it crossing London Bridge. Then there are the main lines for the north to the south of London; one goes over Westminster Bridge, others over Blackfriars and London Bridges; both of the latter bridges are overwhelmed with traffic; they are the only two bridges in the City open free to the public. If Southwark Bridge were open, as it ought to be, and ought to have been a quarter of a century ago, it would afford a very great relief, and a great accommodation to the bridges, which are now quite overcharged with pedestrian traffic. The streets in the City are now indeed impeded by pedestrian traffic; it is not merely vehicular traffic; and as to travelling in a vehicle through them, I have had, within the last three days, some observations taken of the time consumed in passing through the City in cabs and omnibuses.

732. *Chairman.*] How did you ascertain that?

I placed trustworthy assistants outside of omnibuses, and they booked the time and measured off the distance. All these observations of vehicular traffic have been made by trustworthy agents who were not aware of the object in view. I found that an omnibus from Temple Bar through Fleet-street, Ludgate-hill, and thence over London Bridge to the Surrey side, only progressed at the rate of 3·96 miles per hour; that is to say, for a distance of 2,845 yards, it only went at the rate of about four miles an hour. In fact, the mean of various observations of the time taken by omnibuses from Temple Bar to London Bridge, from Temple Bar to Aldgate, from Holborn to London Bridge, and from Holborn to Aldgate, and back again, at various hours of the day, is but 4·35 miles per hour. I have also had observations taken upon cabs, they go quicker. Of course omnibuses lose time on account of their ponderosity and their difficulty of getting through the streets, as compared with lighter vehicles, and also on account of stopping to take up and set down passengers; but the mean rate of cabs through the City is but 5·60 miles per hour.

733. Lord *Stanley.*] So that during the hours of the day when the traffic is greatest there is no possibility of passing through the greater thoroughfares of the City at a speed greater than foot pace?

For an omnibus the lowest rate I have here is three and three quarter miles an hour, which is a very smart foot pace, and the lowest rate of a cab is four and three quarter miles an hour; the greatest speed at which a cab travelled I find was only six and a quarter miles an hour, and that is only upon one occasion; that is between Temple Bar and the City boundary; no doubt it is done quicker occasionally; I have done it quicker myself, but I assure you that I believe this is a very fair average of the rate of travelling in the City; in fact, a person in an omnibus will frequently pass and repass a friend on foot, and get to the Bank exactly at the same time as the pedestrian will; almost all the traffic of the Metropolis seems to come to the City in some shape and at some time, and to choke up the City till it is in the condition I have just described.

734. I presume, in the event of railways being made through London, even though not passing through the City, people would take a long circuit in order to use the railway communications rather than take the street line on foot or in vehicles?

As a rule I think they would; but it would come very much to a question of time; if a man had to make such a long circuit that he would go more quickly by any other conveyance, he would take the other conveyance decidedly; it is a question of time. For instance, if a man lives at Regent's Park, it is a long round for him to go at the present moment by the North London as at present; I think the largest number of people would not go by the North London. When the North London is open to Liverpool-street the case will be different.

735. It is also a question of expense?

In many cases it is a question of expense, certainly; but I do not think, within

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within the limits of the fares of the Metropolitan Railways and omnibuses the expense is a very serious thing, and much considered by those who habitually ride.

736. *Chairman.*] Have you any other suggestion to make to the Committee?
The object of Railway extension in the City should be, I think, mainly this: to enable people to get into the station nearest their place of business, or their own home, and then to be able, by a process more or less convenient, to go to any part of the Metropolis by railway. I have no reason to doubt that, either by fair co-operation between the railway companies, or by some means or other, it could be so arranged that a man would be able to go to the station nearest to his place of business, and thence anywhere in the Metropolis he likes; and that is the only thing that will give a proper measure of relief to the overcrowded streets.

The Witness is directed to withdraw.

THOMAS WEBSTER RAMMELL, Esquire; Examined.

T. W. Rammell, Esq.

737. *Chairman.*] YOU represent the Victoria Station and Thames Embankment Railway?
Yes.

738. And also the Oxford-street and City Railway?
Yes. I am joint engineer, with Mr. Fowler, in the one case, and with Mr. Liddell in the other.

739. Will you state the character of the Victoria Station and Thames Embankment Railway?
It is proposed to lay a line from Victoria Station, under Victoria-street, through New Palace Yard, and along the Thames Embankment to Blackfriars Bridge.

740. Is the line proposed to be worked by locomotives?
It is proposed to be a pneumatic railway.

741. Lord *Stanley* of Alderley.] What is to be the size of your tube?
Ten feet six inches in diameter.

742. Have you had any experience as to the possibility of working with advantage a pneumatic tube of that size?
I have had no actual experience beyond that with the tube now being worked at Euston, which is only 30 inches across.

743. And of what length?
Six hundred yards.

744. You have had no experience, as yet, except in the case of a tube 30 inches in diameter, and of 600 yards in length, whether the principle could be worked advantageously with a tube of larger diameter or of greater length?
As yet we have had no further experience.

745. *Chairman.*] Supposing the experiment to fail, do you consider that a tunnel of that size could be conveniently worked in any other way?
It would require a larger tunnel for a locomotive engine than the proposed tunnel. We are about to bring the question of the practicability of the pneumatic system to trial upon a full scale. We are now laying down a line at the Crystal Palace with that view.

746. Lord *Stanley.*] Of what size?
Of the same size as we propose in this case. We have been working the tube at the Euston Station for one year, performing the mail service.

747. Are you prepared to say at all how it has answered in point of expense and profit, as compared with the locomotive system?
We have no example of the locomotive system applied on that scale.

748. I understand you to say that the experiment has succeeded so far, that

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it has proved the practicability of the plan, but your observations do not enable you to pronounce any judgment upon the probable profits?
The line is too short to enable us to determine that.

749. Colonel *Wilson Patten.*] What would be the length of your line at the Crystal Palace?
It will be a quarter of a mile in length; it is being laid down in the lower part of the grounds; part will be on a level, part upon a moderate gradient, and part on a steep gradient, equal to 1 in 15.

750. Lord *Stanley* of Alderley.] From the experience which you have had on a line only 600 yards long, and with a tube only 30 inches in diameter, can you reasonably infer that you can work advantageously a line of much greater length, and with a tube of a diameter of 10 feet 6 inches?
I think so.

751. Upon what do you ground that expectation?
Our difficulties in fact are greater with a small tube than they would be with a large tube. If you increase the size of the tube, the area of windage becomes less.

752. That is inferential; it is not the result of actual experiment?
We have had no experiment at present beyond this tube.

753. Therefore, to a certain extent this would be tentative, and you are not justified by experience in concluding that a line of this length could be worked advantageously on the pneumatic principle?
As far as regards length, the sections of the tube in both cases would be nearly identical. In the case of the railway, we are proposing to lay down lengths of 600 yards, or very little exceeding 600 yards, from station to station.

754. Is not it the fact, that you have not extended your line from Euston-square to the City, as you proposed to do?
We are extending it to the City.

755. That is not yet at work, is it?
It will be at work in about two months.

756. Where does it terminate?
It starts from Euston Station and is carried down Tottenham-court-road and along Holborn, to a station near Lincoln's Inn Fields.

757. That is now being constructed?
Yes: and from that point we propose to carry the line on to the City.

758. Lord *Redesdale.*] Do you believe that it would be a very comfortable mode of conveying passengers?
In the present tube it is not; but we have carried about a thousand persons through the present tube.

759. Those persons have gone through the tube out of curiosity merely?
No doubt.

760. Mr. *Milner Gibson.*] Supposing the experiment to fail, and you do not succeed in carrying passengers through the tube, your works are not useful for any other purpose; do you provide any security for their removal?
We shall bring the question of the success or failure of the system to a complete trial before it is adopted on this line.

761. Lord *Redesdale.*] Shall you have time to make all those experiments before the Bill is likely to come before the consideration of Parliament?
We expect that by about the middle of April the line at the Crystal Palace will be in operation.

762. *Chairman.*] You also represent the Oxford-street and City Railway?
Yes.

763. Will you state the object of that line?
That line is from the Marble Arch to Farringdon-street, where it joins the Metropolitan Railway. It is intended to accommodate the traffic of Oxford-street and Holborn.

764. Is

764. Is that an underground line of the ordinary character? *T. W. Rammell, Esq.*
It is an underground line of the ordinary character; it may be worked on the pneumatic principle.

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765. Lord *Stanley* of Alderley.] Is it intended to be worked on the pneumatic principle?
It is intended to be worked on the pneumatic principle if we meet with the success we anticipate at the Crystal Palace.

766. Would not it be necessary to make a different kind of tunnel if the line is to be worked by ordinary locomotives?
We should bring the question of the success or failure of the system to an issue before the works would be commenced.

767. You propose to get power beforehand, before you decide upon the principle to be adopted in working the line?
We decide this much: if the experiment succeeds, we shall adopt the pneumatic principle; if it does not succeed, we shall adopt the locomotive principle.

768. Lord *Redesdale.*] In the event of adopting the locomotive principle, would not the estimate be very much increased?
The estimates are large enough to cover the construction of the line as a locomotive line, with a double line of rails.

769. Then, in fact, you have taken too much money for the pneumatic principle?
We have taken a full estimate, and too much for the pneumatic principle.

770. Does it in any way interfere with the sewerage along Oxford-street?
The main sewerage is a long way below our line.

771. *Chairman.*] Do you go under the whole length of Oxford-street?
Under the centre of the street.

772. Lord *Stanley* of Alderley.] Would the construction of the works materially interfere with the traffic and the business of Oxford-street?
I think not.

773. Why not?
I think that the line might be put in with very little public inconvenience.

774. Lord *Stanley.*] You would not at any time require to close the whole street?
No; that is one advantage of the pneumatic system; it might be laid down on one side of the street at a time, and without entirely stopping the street at any time.

The Witness is directed to withdraw.

JAMES BRUNLEES, Esquire; Examined. *J. Brunlees, Esq.*

775. *Chairman.*] YOU represent the London Union Railway?
I am the engineer to it.

776. A portion of the line has been abandoned, has not it; that portion of the line from the Bank to a little beyond Kensington has been withdrawn?
Yes, and also the line dotted, passing Victoria Station; the dotted lines in this map are withdrawn (*producing a Map*).

777. It extends now from Lower Oxgate Farm, to a little beyond Bricklayer's Arms Station?
Yes, there is a junction with the Hampstead and City Railway, which you will see near to Harlesden; then there is also a junction with the South Western, and another junction with the London, Chatham, and Dover Railway; the line consists now of five railways altogether, instead of 10, as I had first intended.

778. It seems to run parallel with the West London Railway?
Yes, it does for some distance. After leaving Lower Oxgate Farm it proceeds to Harlesden, and then for several miles it runs parallel with the West London Line to Chelsea.

J. Brunlees, Esq.

19th Feb. 1864.

779. Colonel *Wilson Patten.*] What is the distance of that line?
The lines would be parallel for three and a half miles.

780. Lord *Stanley.*] What is the object of running close to another line without using it?
The object of laying the line out so, was to give a wholesome competition to the Midland, and the Great Northern, and other lines on the north that have not access to the lines on the south; that was one object. And, moreover, there can be no doubt that, after some few years, the traffic will become so great upon the West London Line, that another line will be necessary between the north and the south; that, I should say, might not be necessary if the West London Company were to duplicate their line, which, I believe, they can do. I believe they have land on which they can duplicate their line.

781. Mr. *Milner Gibson.*] Have they purchased the land for that purpose?
I believe so.

782. Lord *Stanley.*] If they made arrangements with you, your line would be only from Lower Oxgate Farm to Harlesden; you might there join the West London Line, and then run out from the West London at Walham Green?
Yes; if a connexion was made at Wormwood Scrubs, and the rates were so arranged that the various railways would use that length, the parallel part of my scheme might be abandoned.

783. Lord *Stanley* of Alderley.] You propose to take your line between Chelsea Hospital and the River?
Yes.

784. Through the gardens, in fact?
No; in front of the gardens.

785. Earl of *Romney.*] Do you run on the foreshore?
Yes, but on a low level; the railway would not be seen there from the Hospital.

786. Viscount *Eversley.*] You propose to cross the river just below the Penitentiary?
Yes.

787. Lord *Stanley* of Alderley.] How do you propose to cross the Vauxhall Bridge-road; do you cross on a viaduct or underground?
Underground.

788. Do you also cross the Chelsea Bridge-road in the same way?
Yes.

789. You propose to cross by a bridge opposite the Penitentiary; at what elevation would that bridge be?
About 25 feet above high water.

The Witness is directed to withdraw.

T. M. Johnson, Esq.

THOMAS MARR JOHNSON, Esquire; Examined.

790. *Chairman.*] YOU represent the Metropolitan and St. John's Wood Railway?
I am joint engineer to that railway with Mr. Fowler.

791. Will you state the line of your proposed railway?
The railway commences at the Baker-street Station of the Metropolitan Railway, and passes up the Park-road; then up the Finchley-road, and terminates at the Finchley-road Station of the Hampstead and City Junction Railway.

792. What is the object that you wish to accomplish by the construction of this railway?
It is intended as a feeder to the Metropolitan main line, and to give communication with the City and with all stations upon that railway.

793. Are

793. Are you in connexion with that line?
I am the resident engineer of the Metropolitan Railway.

794. The Metropolitan Railway Company approve of this scheme?
Yes.

795. Do the Metropolitan Company take part in it?
Not precisely so, for it is promoted by a separate company, but some of the directors are also upon the Board of the St. John's Wood Line.

796. Lord *Stanley* of Alderley.] Is it underground?
The line is underground in the streets; but where it is at the back of property, it would be open. Every station is proposed to be in the open.

797. On what principle is it to be worked?
With the improved locomotives, similar to those now being constructed for the Metropolitan Railway.

798. *Chairman.*] The object of it is to feed the Metropolitan Railway, and to give access to the population on the north-west of London?
Yes.

799. Lord *Redesdale.*] Was it originally intended to work this as a pneumatic line?
No; it was never intended to be a pneumatic line.

800. Colonel *Wilson Patten.*] What is the length of it?
A little over two miles and a quarter.

801. What is the estimate?
£. 300,000.

802. Is this a speculative affair, or is it brought forward by a body of shareholders?
It has not been brought out; but it is largely supported by the residential population, and by influential proprietors in the district.

803. *Chairman.*] Is it proposed to put it under the Finchley-road.
It is proposed to make it a single line on one side of the road, so as to permit the traffic of the road to be kept up during its construction. The line will be double at stations and passing places, and these being open to the air, will be placed off the road.

804. Lord *Redesdale.*] Does it interfere with any sewer?
It displaces sewers, the same as the Metropolitan Railway did; but I understand the sewerage of that road is likely to undergo very considerable modification by works contemplated by the Board of Works themselves. The reconstruction of the sewers might be done at the same time.

805. Have you had any communication with the Board of Works?
Not officially with the Board of Works. The sewers are subsidiaries, and therefore under the jurisdiction of the vestry of the parish of Marylebone, who I have reason to believe, will not object to our diverting the sewers as we propose. The parish of Marylebone do not oppose the line.

The Witness is directed to withdraw.

Ordered, that the Committee be adjourned till Thursday next, Twelve o'clock.

REFORM CLUB
PALL MALL

APPENDIX.

Appendix.

LETTER from Mr. *W. H. Le Feuvre* to the Committee on Metropolitan Railway Schemes in the Metropolis.

HAMPSTEAD, MIDLAND, NORTH WESTERN AND CHARING CROSS JUNCTION RAILWAY.

18, Great George-street, Westminster, S.W.,
25 February 1864.

My Lords and Gentlemen,

WHEN I had the honour of appearing before you as one of the Engineers of the above proposed Railway, I omitted to state the arrangements proposed for working the traffic on this Railway in conjunction with an "inner circle," embracing an extension of the Metropolitan Railway to Tower Hill in the City on the east, and Kensington on the west. I now take the liberty of supplying such omission.

It is proposed to start trains every five minutes from the Thames Embankment at Charing Cross (at the Junction of this Railway with the proposed Railway along the Thames Embankment) to Camden Town, and intersect the Metropolitan Railway at Euston-road and Tottenham-court-road.

It is the intention of the Metropolitan Railway Company to have trains starting every five minutes each way, so that passengers going from Charing Cross to the north, north-east, and north-west districts of London would be thus accommodated.

An inner circle, as proposed by the extension of the Metropolitan Railway, may be virtually termed an "inner ellipse," having a major axis of 5¼ miles, Kensington on the west, and Tower Hill in the City on the east. A minor axis of 1½ miles, Euston-road on the north, the Thames Embankment at Charing Cross on the south.

The Hampstead and Charing Cross Railway, in conjunction with the Metropolitan Railway and its proposed extensions would thus accommodate the traffic going north, north-east, and north-west of Charing Cross, and traffic going south, south-east, and south-west of Euston-road.

The distance by the Hampstead and Charing Cross Railway from Charing Cross to Euston-road, at Tottenham-court-road, being 1½ miles, and by the proposed extension of the Metropolitan Railway westward, 7½ miles.

A Plan accompanies this letter.

I have, &c.

Wm. H. Le Feuvre.

REPORT

FROM THE

SELECT COMMITTEE

ON THE

METROPOLITAN SUBWAYS BILL;

TOGETHER WITH THE

PROCEEDINGS OF THE COMMITTEE,

MINUTES OF EVIDENCE,

AND APPENDIX.

Ordered, by The House of Commons, *to be Printed,*
13 *June* 1864.

Mercurii, 16° *die Martii*, 1864.

Metropolitan Subways Bill,—Read 2°, and committed to a Select Committee of Five Members to be nominated by the Committee of Selection; and parties opposing to be heard by Counsel against the said Bill before the said Committee.

Veneris, 15° *die Aprilis*, 1864.

Committee nominated by Committee of Selection :—

Mr. More O'Ferrall.	Mr. F. S. Powell.
Mr. Du Pre.	Mr. Floyer.
Viscount Grey de Wilton.	

Martis, 19° *die Aprilis*, 1864.

Mr. *More O'Ferrall* discharged.

Mr. *Clay* added

Martis, 26° *die Aprilis*, 1864.

Mr. *Clay* discharged.

Sir *Baldwin Leighton* added.

Veneris, 29° *die Aprilis*, 1864.

Ordered, That Three be the Quorum of the Committee.

The following Petitions were referred to the Committee :—

(Presented 4th April.)

West Middlesex Waterworks Company.

The several Metropolitan Gas Companies whose names are thereunto subscribed (two Petitions).

Lambeth Waterworks Company.

New River Company.

Chelsea Waterworks Company.

East London Waterworks Company.

Southwark and Vauxhall Waterworks Company.

Grand Junction Waterworks Company.

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REPORT.

THE SELECT COMMITTEE to whom the METROPOLITAN SUBWAYS BILL was referred;——HAVE proceeded in the examination of the allegations contained in the Preamble of the Bill, and had amended the same by striking out therefrom the word "Gas," when the parties promoting the Bill stated to the Committee that it was not their intention to proceed further with the same.

13 *June* 1864.

PROCEEDINGS OF THE COMMITTEE.

Veneris, 6° *die Maii*, 1864.

MEMBERS PRESENT:

Sir BALDWIN LEIGHTON in the Chair.

Viscount Grey de Wilton. | Mr. Du Pre.

Counsel: Mr. *Phinn*, Mr. *Johnson*, and Mr. *Wilkinson*.—Agents: Messrs. *Dyson & Co.*

PETITIONS against the Bill, read:—

Southwark and Vauxhall Water Company:—

Counsel: Mr. *Rodwell*, Mr. *Bruce*, and Mr. *Holland*.—Agents: Messrs. *Pritt & Co.*

Grand Junction Water Company:—

Counsel: Mr. *Rodwell*, Mr. *Bruce*, and Mr. *Holland*.—Agents: Messrs. *Pritt & Co.*

West Middlesex Water Company:—

Counsel: Mr. *Denison* and Mr. *Toulmin Smith*.—Agents: Messrs. *Pritt & Co.*

Metropolitan Gas Companies (London Gas Company and others):—

Counsel: Mr. *Hope Scott*, Mr. *Denison*, Mr. *Burke*, and Mr. *Richards*.—Agents: Messrs. *Pritt & Co.*

Lambeth Waterworks Company:—

Counsel: Mr. *Denison*, Mr. *Davison*, and Mr. *Toulmin Smith*.—Agents: Messrs. *Bell, Steward & Lloyd.*

New River Company:—

Counsel: Mr. *Hope Scott*, Mr. *Burke*, and Mr. *Vernon Harcourt*.—Agents: Messrs. *Dorington & Co.*

Chelsea Waterworks Company:—

Counsel: Mr. *Denison*, Mr. *Davison*, and Mr. *Toulmin Smith*.—Agents: Messrs. *Dorington & Co.*

The following Petitions were also read, but no parties appeared in support thereof:—

London Gas Company.

Gas Light and Coke Company.

South Metropolitan Gas Light and Coke Company.

Surrey Consumers' Gas Company.

Radcliffe Gas Light and Coke Company.

Great Central Gas Consumers' Company.

Equitable Gas Light Company.

City of London Gas Light and Coke Company.

Phœnix Gas Light Company.

Western Gas Light and Coke Company.

Preamble of the Bill read 1°.

Mr. *Phinn* opened the case of the Promoters in support of the Preamble of the Bill.

Charles Fry, Frederick Goddard, and *Joseph Bazalgette,* were severally examined in support of the Preamble of the Bill.

[Adjourned till Monday, at Twelve o'clock.

Lunæ, 9° *die Maii,* 1864.

MEMBERS PRESENT:

Sir BALDWIN LEIGHTON in the Chair.

Mr. Floyer.	Lord Grey de Wilton.
Mr. F. S. Powell.	Mr. Du Pre.

The following witnesses were examined in proof of the Preamble of the Bill:—*Frederick Marrable, William Tite,* a Member of the House, *William Carpmael,* and *Lewis Henry Isaacs.*

[Adjourned till To-morrow, at Twelve o'clock.

Martis, 10° *die Maii,* 1864.

MEMBERS PRESENT:

Sir BALDWIN LEIGHTON in the Chair.

Mr. Floyer.	Lord Grey de Wilton.
Mr. F. S. Powell.	Mr. Du Pre.

Room cleared.—Committee deliberated.

Parties called in.

The following witnesses were examined in proof of the Preamble of the Bill:—

George Hemans, Marriott Tarbotton, Henry Armstrong, and *Joseph Bazalgette.*

[Adjourned till To-morrow, at Twelve o'clock.

Mercurii, 11° *die Maii,* 1864.

MEMBERS PRESENT:

Sir BALDWIN LEIGHTON in the Chair.

Mr. Floyer.	Lord Grey de Wilton.
Mr. F. S. Powell.	Mr. Du Pre.

The following witnesses were examined in proof of the Preamble of the Bill:—

Joseph Bazalgette, Robert Jones, Alfred Upward, and *Frederick Bramwell.*

Mr. *Phinn* stated that he should not adduce further evidence in support of the Preamble of the Bill.

Mr. *Hope Scott,* on behalf of the Gas Companies, addressed the Committee in opposition to the Preamble of the Bill.

[Adjourned till To-morrow, at Twelve o'clock.

Jovis, 12° *die Maii*, 1864.

MEMBERS PRESENT:

Sir BALDWIN LEIGHTON in the Chair.

Mr. Floyer.	Lord Grey de Wilton.
Mr. F. S. Powell.	Mr. Du Pre.

Mr. *Hope Scott*, on behalf of the Gas Companies, was heard in continuation of his address.

The following witnesses were examined in opposition to the Preamble of the Bill:—

William Innes and *Edward Hawkins*.

[Adjourned till To-morrow, at Twelve o'clock.

Veneris, 13° *die Maii*, 1864.

MEMBERS PRESENT:

Sir BALDWIN LEIGHTON in the Chair.

Mr. Floyer.	Lord Grey de Wilton.
Mr. F. S. Powell.	Mr. Du Pre.

The following witnesses were examined in opposition to the Preamble of the Bill:—

Frederick Bramwell and *James Simpson*.

[Adjourned till Thursday, the 26th May, at 12 o'clock.

Jovis, 26° *die Maii*, 1864.

MEMBERS PRESENT:

Sir BALDWIN LEIGHTON in the Chair.

Lord Grey de Wilton.	Mr. Floyer.
Mr. Du Pre.	Mr. F. S. Powell.

At the meeting of the Committee this day, Mr. Phinn informed the Committee the Promoters of the Bill had amended the Preamble of their Bill, and handed in copies of their Bill.

John F. Bateman and *James Muir* were severally examined in opposition to the Preamble of the Bill.

[Adjourned till To-morrow, at Twelve o'clock.

Veneris, 27° *die Maii*, 1864.

MEMBERS PRESENT.

Sir BALDWIN LEIGHTON in the Chair.

Mr. Du Pre.	Mr. F. S. Powell.
Mr. Floyer.	

Thomas Hersey, *Horatio Brothers*, *Charles Greaves*, and *William Haywood*, were severally examined in opposition to the Preamble of the Bill.

[Adjourned till Monday, at Twelve o'clock.

Lunæ, 30° *die Maii*, 1864.

MEMBERS PRESENT:

Sir BALDWIN LEIGHTON in the Chair.

Lord Grey de Wilton.	Mr. Floyer.
Mr. Du Pre.	Mr. F. S. Powell.

James Myr, *François Belgraud*, *Thomas G. Barlow*, and *John Stephens*, severally examined in opposition to the Preamble of the Bill.

[Adjourned till To-morrow, at Twelve o'clock.

Martis, 31° *die Maii*, 1864.

MEMBERS PRESENT:

Sir BALDWIN LEIGHTON in the Chair.

Lord Grey de Wilton.	Mr. Floyer.
Mr. Du Pre.	Mr. F. S. Powell.

Thomas Hawkesley examined.

Mr. *Denison*, on behalf of the Water Companies, addressed the Committee in opposition to the Preamble of the Bill.

[Adjourned till To-morrow, at Twelve o'clock.

Mercurii, 1° *die Junii*, 1864.

MEMBERS PRESENT:

Sir BALDWIN LEIGHTON in the Chair.

Lord Grey de Wilton.	Mr. Floyer.
Mr. Du Pre.	Mr. F. S. Powell.

Mr. *Phinn* replied on the whole case in support of the Preamble of the Bill.

Room cleared.

Committee deliberated.

Resolved, That so much of the Bill as relates to the compulsory placing of the gas pipes in the Subways be omitted.

That the Preamble should read thus:—

"Whereas Subways have been constructed, or are proposed to be constructed, in a new street near Covent-garden, under Southwark-street, under the proposed Thames Embankment, North side, and under the proposed new street between Blackfriars and the Mansion House, by the Metropolitan Board of Works, hereinafter called the Board:

"And whereas, in order to prevent inconvenience to the public by the frequent breaking up of the said streets, it is expedient to enable the Board to require companies or persons intending or required to place water and other pipes, except gas pipes, in the said streets, and to lay the same in the Subways, upon proper terms and conditions."

The Chairman also informed the parties the Committee had agreed that MS. Clause C. should read thus:—

In determining, in any case, the amount and form of such payment, the arbitrators or umpire acting in the arbitration shall have regard to the pecuniary benefit accruing to the

company, body, or person using the Subway, by reason of saving in respect of leakage, and in respect of the expense of, and connected with, the laying, fitting, inspection, and repair of pipes, and the opening and relaying of roads, and paving and repairing, and otherwise by reason of the use of the Subway.

[Adjourned till Friday next, at Two o'clock.

Veneris, 3° die Junii, 1864.

MEMBERS PRESENT:

Sir BALDWIN LEIGHTON in the Chair.

Mr. Powell.	Mr. Du Pre.
Lord Grey de Wilton.	Mr. Floyer.

At the meeting of the Committee, Mr. Johnson, on behalf of the Promoters of the Bill, stated that after the decision of the Committee, excluding gas pipes from the Bill, the Promoters had decided on not proceeding further with the said Bill.

Committee-room cleared.

Resolved, That the Chairman be directed to report to the House, that the Committee had proceeded with the allegations of the Bill, and had amended the Preamble, by striking out the word "gas," when the Promoters of the Bill informed them that it was not their intention to proceed further with the same.

Ordered, To Report.

MINUTES OF EVIDENCE.

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MINUTES OF EVIDENCE.

Veneris, 6° *die Maii*, 1864.

MEMBERS PRESENT:

Mr. Du Pré.
Viscount Grey de Wilton.
Sir Baldwin Leighton.

SIR BALDWIN LEIGHTON, BART., IN THE CHAIR.

The Petition for the Bill was read.

6 May 1864.

Mr. *Phinn*, Mr. *Johnson*, and Mr. *Wilkinson*, appeared as Counsel for the Promoters of the Bill.
Messrs. *Dyson, Parkes, Coates & Shrubsole*, appeared as Agents.

The following Petitions against the Bill were read:

The Petition of the Southwark and Vauxhall Water Company.

Mr. *Rodwell*, Mr. *Bruce* and Mr. *Holland*, appeared as Counsel for the Petitioners.
Messrs. *Pritt, Sherwood, Venables & Grubbe*, appeared as Agents.

The Petition of the Grand Junction Water Company.

Mr. *Rodwell*, Mr. *Bruce* and Mr. *Holland*, appeared as Counsel for the Petitioners.
Messrs. *Pritt & Co.* appeared as Agents.

The Petition of the West Middlesex Water Company.

Mr. *Denison*, Mr. *Davison* and Mr. *Toulmin Smith*, appeared as Counsel for the Petitioners.
Messrs. *Pritt & Co.* appeared as Agents.

The Petition of the Metropolitan Gas Companies (London Gas Company and others).

Mr. *Hope Scott*, Mr. *Denison*, Mr. *Burke* and Mr. *Richards*, appeared as Counsel for the Petitioners.
Messrs. *Pritt & Co.* appeared as Agents.

The Petition of the Metropolitan Gas Companies. (The Equitable Gas Company and others).

Mr. *Hope Scott*, Mr. *Denison*, Mr. *Burke* and Mr. *Richards*, appeared as Counsel for the Petitioners.
Messrs. *Pritt & Co.* appeared as Agents.

6 May 1864.

The Petition of the Lambeth Waterworks Company.

Mr. *Denison*, Mr. *Davison* and Mr. *Toulmin Smith*, appeared as Counsel for the Petitioners.

Messrs. *Bell, Steward & Lloyd* appeared as Agents.

The Petition of the New River Company.

Mr. *Hope Scott*, Mr. *Burke* and Mr. *Vernon Harcourt*, appeared as Counsel for the Petitioners.

Messrs. *Dorrington & Co.* appeared as Agents.

The Petition of the Chelsea Waterworks Company.

Mr. *Denison*, Mr. *Davison*, and Mr. *Toulmin Smith*, appeared as Counsel in support of the Petition.

Messrs. *Dorrington & Co.* appeared as Agents.

Mr. *Phinn* was heard to open the case on behalf of the Promoters of the Bill.

Mr. *Wilkinson* handed in the Report of the Committee on the City of London Traffic Regulations.

Mr. *Charles Fry*, sworn; Examined by Mr. *Wilkinson*.

Mr. *Charles Fry.*

1. Do you produce some returns obtained from the parishes of the Metropolis showing the number of applications made for permission to disturb the streets?—I do (*producing some Papers.*)

2. Did you obtain those several returns from the proper officers, representing the several parishes referred to?—I did.

3. Is the first return from the parish of St. Martin-in-the-Fields?—It is.

4. Is that a return of the number of times that trenches were opened by the several gas and water companies in the parish of St. Martin-in-the-Fields, from the year 1856 to 1863 inclusive?—It is.

5. Taking the year 1856, is it a fact that in that year the Equitable Gas Company opened trenches 246 times?—Yes.

6. The London Gas Company opened trenches 184 times, did they not?—Yes.

7. The Chartered Gas Company open trenches 287 times?—Yes.

8. The New River Company 495 times?—Yes.

9. The Chelsea Water Company 44 times?—Yes.

10. Does that give a total of 1,256 times for the year 1856?—It does.

11. *Chairman.*] Will you give us the total for the seven years?—The total is 10,377 times.

12. Mr. *Wilkinson.*] Was the total number of the Equitable Gas Company's applications 5,124?—It was.

13. And of the London Gas Company 741?—Yes.

14. And of the Chartered Gas Company 706?—Yes.

15. And of the New River Company 3,387?—Yes.

16. And of the Chelsea Water Company 419?—Yes.

17. Does that give you a gross total for these seven years of 10,377?—It does.

18. *Chairman.*] How many companies have you returns of?—Five companies.

19. Mr. *Wilkinson*] The Companies were the Equitable Gas, the London Gas, the Chartered Gas, the New River Company, and the Chelsea Water Company, were they not?—Yes.

20. Now, take the parish of St. Marylebone, have you a similar return from that parish for the years 1859, 1860, 1861, 1862, and 1863?—I have.

21. That is for five years?—Yes.

22. Does

22. Does that return relate to the Imperial Gas, the West Middlesex Water, the Grand Junction Water, and the Chartered Gas Companies?—Yes, and the New River Company and the Telegraph Company.

23. The Telegraph Company has only applied four times altogether, has it?—Yes, that is all.

24. Does it appear from that return that the Imperial Gas Company, during those five years, made 24,112 applications?—Yes.

25. And the West Middlesex Water Company 14,408?—Yes.

26. The Grand Junction Water Company 3,519?—Yes.

27. The Chartered Gas Company 2,793?—Yes.

28. And the New River Water Company 96?—Yes.

29. Can you give me the gross total of those applications?—Forty-four thousand nine hundred and thirty-two.

30. Have you a return from the Strand Union?—From the Board of Works for the Strand district.

31. You have a return from them, have you not?—I have.

32. For how many years?—From May 1859 to May 1864 inclusive.

33. That is for five years, is it not?—Yes.

34. Will you state the total?—The total number of openings was 9,474.

35. You have not the particulars, I think, of the companies there?—No, I have not.

36. Have you a similar return from the parish of St. James, Westminster?—Yes, I have.

37. For how many years?—Five years.

38. What is the grand total?—The grand total is 9,445.

39. Have you a similar return from the Board of the Holborn district?—I have.

40. For how many years?—For five years, from 1859 to 1863; the grand total is 5,332.

41. Does that comprise applications from the London Gas Company, the Imperial Gas Company, the Chartered Gas Company, the City of London Gas Company, and the New River Company?—It does.

42. Have you a similar return from the parish of Paddington?—I have.

43. Is that for the same number of years?—For the years 1859 to 1863 inclusive.

44. The grand total is 9,225?—Yes; that includes the water, gas, and telegraph companies.

45. *Chairman.*] I presume every application was acceded to?—That I am hardly able to answer. I know that the companies made them.

46. Mr. *Wilkinson.*] You are not aware of any refusal on the part of any parish to comply with the applications?—I am not.

Cross-Examined by *Mr. Burke.*

47. When you got those returns, did you ascertain what the openings were for?—No, it is merely the grand total that is given.

48. You do not know whether they were for laying service pipes?—I do not.

49. Do you know that streets are very often opened simply for the purpose of laying service pipes?—Yes.

50. They must be so under any circumstances?—Yes, I presume so.

51. You do not know where the openings were made; they might be pavements, for instance, or footways?—Yes.

52. You cannot tell us in what localities these openings took place, or what extent they occupied?—No.

53. They may have been a foot long, for instance?—Yes, for what I know.

54. During the period that you mentioned, the gas companies were competing with each other, were they not in many districts?—I cannot answer that question.

55. Do not you know the fact, that recently an Act of Parliament was passed to divide London into districts, and prevent the competition between the gas companies?—I do not know that of my own knowledge.

Mr. *Charles Fry.*

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56. If it should be so, that there were one or two gas companies competing in the same street, of necessity that would involve more openings than when there is one company only?—Yes.

57. *Chairman.*] You can speak to nothing except producing the returns?—Yes, that is all.

58. Mr. *Burke.*] You have only a general knowledge of the contents of them?—That is all. I will hand in the papers which I have produced.

[*The same were handed in and are as follow:*—]

RETURN of the Number of TRENCHES Opened by the several GAS and WATER COMPANIES throughout the Parish of *St. Martin-in-the-Fields*, during the Years 1856, 1857, 1858, 1859, 1860, 1861, 1862, and 1863.

COMPANY.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	1863.	TOTAL.
Equitable Gas - - -	246	638	1,277	994	482	512	494	481	5,124
London Gas - - -	184	225	171	55	42	27	17	20	741
Chartered Gas - - -	287	196	27	12	122	43	16	3	706
New River - - -	495	477	343	453	397	407	406	409	3,387
Chelsea Water - - -	44	65	61	48	34	56	59	52	419
	1,256	1,601	1,879	1,562	1,077	1,045	992	965	10,377

To Metropolitan Board of Works. May 3d, 1864.

ST. MARYLEBONE.

RETURN of Openings in PAVEMENTS by GAS and WATER and TELEGRAPH COMPANIES for the Under-mentioned Years:

—	Imperial Gas.	West Middlesex Water.	Grand Junction Water.	Chartered Gas.	New River Water.	Telegraph Company.
1859 -	5,480	3,248	618	498	24	2
1860 -	5,232	2,792	714	648	21	1
1861 -	5,208	2,888	879	603	18	—
1862 -	4,144	2,872	681	507	24	—
1863 -	4,048	2,608	627	537	9	1
	24,112	14,408	3,519	2,793	96	4

4th May 1864. *W. E. Greenwich*, Vestry Clerk.

Mr. *Charles Fry.*

6 May 1864.

The Board of Works for the Strand District, 5, Tavistock-street, Covent Garden, W.C., 2d May 1864.

Dear Sir,

A return of all notices for the last five years by Water, Gas, and Telegraph Companies, for the purpose of breaking up the streets for their works. In reply to the foregoing, I beg to inform you that from May 1859 to May 1864, inclusive, the several companies have made 9,474 openings.

I am, dear Sir, your obedient servant,

George Frederick Fry,
Surveyor to the Board.

To J. S. Phillips, Esq.,
Member of the Metropolitan Board of Works.

" St. James, Westminster, from March 1862 to March 1864.

[Correct return for two years, the five would take too long to abstract, as we have no one to do it, there being no less than 1,500 pages.]

Chartered - - - - -	1,648
Western - - - - - -	826
Junction - - - - -	1,057
New River - - - - -	210
Chelsea - - - - - -	37
	2) 3,778
	1,889 per annum.
	5
	9,445 in 5 years.

Or, in round numbers, including openings for drains and other purposes that might be obviated by a subway, say 10,000 trenches in five years.

Dear Mr. Cresy,

I send you the return for which you asked me.

Yours, very truly,
H. B.

Board of Works (Holborn District), Surveyor's Department. Office, Little Gray's Inn Lane, E.C., 3d May 1864.—RETURN of Openings made by the Public Companies in the Streets of this District during the last Five Years.

Year.	London Gas Company.	Imperial Gas Company.	Chartered Gas Company.	City of London Gas Company.	New River Company.	Total.
1859 -	178	135	81	97	507	998
1860 -	192	124	68	92	567	1,043
1861 -	222	146	67	149	615	1,199
1862 -	180	110	48	91	652	1,081
1863 -	177	65	57	73	639	1,011
				Grand Total - -		5,332

Arvis H. Isaacs,
Surveyor to the Board.

Mr. *Charles Fry.*

6 May 1864.

PARISH OF PADDINGTON.

A RETURN of the NUMBER of OPENINGS made by Water, Gas, and Telegraph Companies, in the Public Streets for Five Years.

YEARS.	NUMBER.
1859-60 - - - -	1,819
1860-61 - - - -	1,987
1861-62 - - - -	1,789
1862-63 - - - -	1,879
1863-64 - - - -	1,751
	9,225

George F. Stevens.

Cross-examined by Mr. *Toulmin Smith.*

59. Do the returns distinguish what purposes the openings were for?—No.

60. Do you know how many miles in length of street they refer to?—No.

61. *Chairman.*] What office do you hold?—I am assistant in the Solicitor's Department of the Metropolitan Board of Works.

62. You have nothing at all to do with gas or water companies, have you?—No, not at all.

[The Witness withdrew.

Mr. *Frederick William Goddard,* sworn; Examined by Mr. *Wilkinson.*

Mr. *F. W. Goddard.*

63. WHAT are you?—I am one of the surveyors in the Superintending Architect's Office of the Metropolitan Board of Works.

64. You are an assistant surveyor of the Metropolitan Board of Works; is that so?—Yes.

65. Did you in the year 1863 take means to ascertain the traffic existing in the neighbourhood of Blackfriars, at the entrance to Blackfriars Bridge, at the entrance to Ludgate Hill and Farringdon-street, and at the junction of the Poultry, near the Mansion House?—I did.

66. Did you obtain returns, stating accurately the traffic so ascertained by you?—I did.

67. Are those the returns of traffic which you hold in your hand?—They are.

68. Are those the same returns which were presented by you on the occasion of the inquiry before the Select Committee on the Thames Embankment Bill?—They are.

69. Will you hand them in to the Committee?—I will, (*The same were handed in,* vide *Appendix*).

70. This is the print of the evidence that you gave before the Thames Embankment Committee, is it not (*handing a paper to the Witness*)?—It is.

[The Witness withdrew.

Joseph William Bazalgette, Esq., sworn; Examined by Mr. *Phinn.*

J. W. Bazalgette, Esq.

71. I BELIEVE you are Engineer to the Metropolitan Board of Works?—Yes.

72. How long have you been their engineer?—Ever since the Board was constituted.

73. That

73. That was at the end of the year 1855?—It was.

74. I believe you have had under your superintendence all their works?—I have.

75. Including the works for the main drainage, and the construction of the new streets?—Yes.

76. I need not take you through those various streets that have been constructed; the Covent Garden approach was the first work, I think, that you had authority for?—Yes, it was the first street.

77. You subsequently got authority for the Southwark street?—Yes.

78. And for the Thames Embankment, and the street connected with it?—Yes; we have completed the Southwark street, and are now about to form the Thames Embankment and new street. We have let the contracts for the Thames Embankment. There will be a subway in connexion with it and the new street. The contract for the new street is not let; but we are making preparations for it

79. You have also the Victoria Park approaches under your control, I think?—Yes.

80. You are to construct that?—Yes.

81. Is that constructed?—Yes.

82. With a subway?—No; not with a subway.

83. You have in contemplation two embankments, one on each side of the river, have you not?—Yes.

84. The embankment from Westminster Bridge to Blackfriars?—Yes.

85. And one from Westminster Bridge, on the south side of the river, to Vauxhall?—Yes.

86. And a new street from Blackfriars to the Mansion House?—Yes.

87. You have special authority to make a subway there. You mentioned to Parliament your intention of making a subway in the embankment, did you not?—Yes; we did.

88. Has the attention of the Metropolitan Board, from a very early period, been directed to this system of subways?—From a very early period after they came into existence.

89. I believe it was referred, as early as April 1857, to some gentlemen of great eminence, to consider the whole subject, and report to the Board?—Yes, it was.

90. Who did that committee consist of?—Of the late Mr. Robert Stephenson, Mr. Hawksley, Mr. George Lowe, the gas engineer, Mr. Wyatt, the architect, Mr. Thwaites, the chairman of the Metropolitan Board of Works, and the late Lord Mayor, Mr. Cubitt.

91. Mr. William Cubitt, you mean, do you not?—No; Mr. Alderman Cubitt, Mr. Wright, a well-known gas engineer, Mr. Marrable, the superintending architect of the Board of Works, and myself.

92. They were empowered, the Board having offered a premium for the best design for a street, including a subway, to decide upon that subject, were they not?—They were.

93. That is their report, is it not (*handing a Paper to the Witness*)?—Yes (*handing in the same*, vide *Appendix*). The Metropolitan Board of Works having for some time before had their attention called to the great inconvenience of breaking up the streets, and laying gas and water pipes and other things under the thoroughfares, advertised for designs to be sent to them for the best mode of constructing subways for taking all these pipes; designs for subways had been prepared very many years before the Board of Works was constituted; the subject was talked of 20 or 30 years ago. They received 39 different designs, and then they invited the gentlemen whom I have named, as the best authorities to determine upon which was the best sort of subway to meet the requirements of the case, and to award premiums for the best designs.

94. There were some premiums awarded, I believe?—Yes; they divided it into two classes—subways for first-class streets, and subways for second-class streets—they considered that the second-class streets would not require so large a construction, and that they could be done more cheaply. They awarded three premiums for designs for a first-class street; 100 guineas for the best design, 50 guineas for the second, and 10 guineas for the third. For the second-class streets also, they gave premiums—50 guineas for the first, 20 guineas for the second, and five guineas for the third. The Committee selected what they

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thought the nearest approach to a good design, but they stated that they were not quite satisfied with the detailed arrangements of any one of them.

95. I suppose those gentlemen, of course, had under their consideration the application of the subways, to laying the gas and water mains, and various other subterranean works?—Yes, they have very fully considered all those points, and had a great many meetings, at which those points were very carefully discussed.

96. In the construction of your streets at Covent Garden and Southwark, you have adopted a system of subways, I think?—We have; that was the first subway that was constructed.

97. I believe I made a mistake in stating the cost of the subways in my opening speech?—The cost has averaged, taking all the side galleries and ventilating shafts, and everything connected with it, about 3*l.* a foot.

98. *Chairman.*] £.3 a foot run?—Yes; about 16,000*l.* a mile; something under that, I think.

99. Mr. *Phinn.*] My suggestion of 8,000*l.* was a mistake, I think?—Yes; it is about 16,000*l.*, as nearly as can be.

100. What are the dimensions of this Cranbourne-street, and Southwark-street we will call it Covent Garden-street; are they first-class streets, according to your enumeration?—They are not main, or first-class thoroughfares, but they are streets of considerable importance, with a great deal of traffic over them.

101. Will you state to the Committee what the construction of the subways is there; what are the dimensions?—There is a tunnel, of a half circle, with a radius of 6½ feet; therefore, it is 6½ feet high, and 13 feet wide in the Covent Garden approach; it is shown upon that drawing in front of me, and the small drawing at the side. Then, from it, there are side galleries communicating with the cellars; one gallery for every two houses, so that by passing up that gallery, the service pipes can be laid into the cellars of the houses, without disturbing the surface at all.

102. Can you get access to the pipe for each house; is there a point at which the pipes branch off for each house?—There is.

103. Can you get access as far as that?—You can; right up to the cellar in front of the house.

104. *Chairman.*] What are the dimensions of those side galleries?—They are three feet nine inches high by two feet six inches wide; just large enough for a workman to walk up them in a stooping position. I am not quite certain whether it is two feet six, or three feet in width.

105. Mr. *Phinn.*] With regard to the floor of the subway, how is it constructed: is it a solid floor above the sewer?—Yes; the sewer is covered as it is shown upon the section, and the floor is perfectly solid gravel.

106. Is the sewer a round pipe?—The sewer in the Covent Garden approach is a brick sewer, in the shape of an egg, with the largest end of the egg upwards. Of course the size of the sewer varies in different streets.

107. Does the Southwark-street Subway differ at all in its dimensions?—The Southwark-street Subway has a six-feet radius; that is, 12 feet in diameter instead of 13 feet.

108. Those are the only two subways you have constructed yet in the Metropolis, are they not?—They are the only two which have yet been constructed.

109. What is the length of each?—The Southwark-street is 3,292 feet, and the Covent Garden is 320 feet in length.

110. I may ask you, at this period of your examination, whether you would be able to conduct the Committee, and any of the parties, through those subways?—Certainly; with pleasure. They have been visited by a large number of people connected with the Metropolis already. I believe the Gas Companies have, most of them, seen them.

111. They are carried through the centre of the street, are they not?—They are.

112. Then they admit the sewers, and so on, for the houses on each side?—Yes. I think this drawing, perhaps, explains the state of things best—(*producing a Drawing*). Here are the fronts of the houses; there are the areas in front of the houses, and those are the cellars which come underneath the pavements.

ments. This represents the side galleries passing from the main subway into those cellars up to the areas, and the sewer is here (*pointing out the same on the Plan*).

113. This model shows it perfectly, does it not?—Yes, the model shows it perhaps even more correctly. Here is the centre subway; those are the small galleries passing up to the cellars and areas (*explaining the same on the Model*). This shows it in section (*dissecting the Model*). There is the drain. There is the passage coming up to the area. Here is the sewer, and there is the subway above it.

114. The crossways of communication with the houses run clear of the cellars, do they not?—They come up to the cellars.

115. How do they pass from the cellars to the wall of the house?—There (*pointing to the Plan*) is the opening in the cellar wall through which the pipes are put. A man from the subway cannot get into the cellars of the houses there. One workman comes into the cellar, and the others meet him on this side and he receives the pipe; it is put through the 9-inch wall. This shows it (*pointing to another Plan*). Here is the subway coming up to the wall of the cellars; a man coming down into that cellar would receive the pipe here. The Committee can walk up the subways and see the things in operation.

116. That shows exactly the state of things in Covent Garden. That is taken from the Covent Garden Subway, is it not?—Yes, it is.

117. Have you had experience of pipes being laid in that Covent Garden Subway?—Yes, there are pipes laid there,

118. What Company have pipes there?—The New River Company has a 6-inch water pipe, and the Equitable Gas Company has two 6-inch gas pipes.

119. Has there been any difficulty attending either the laying or the maintaining of those pipes?—None whatever.

120. Has there been any escape of gas?—Not that I am aware of.

121. They are not laid exactly as you propose hereafter to lay them; they have been buried beneath the gravel, and above the sewer?—Yes; they have.

122. Was that in accordance with your views and wishes?—No, I think it was in accordance with their own wishes. I think it would be preferable to lay them upon chairs raised a little above the flooring of the subway, so that the persons could examine the joints, and examine the pipes all round with greater facility.

123. I suppose the force of habit is very strong; they must have a little gravel or soil above the pipes?—I suppose the view taken was, that the gravel round it would form a compact body, and prevent leakage. but I believe when pipes are laid in the soil they are more likely to be carelessly laid, and any defect is not so easily discovered and remedied.

124. Were you at all present whilst the pipes were being laid?—No, I was not.

125. When was the pipe of the Equitable Gas Company first laid in that subway; do you know?—I cannot give you the date.

126. It is suggested to me that it was in the early part of 1861?—It was in the early part of 1861; the street was opened in January 1861, and the pipes were laid very shortly afterwards.

127. When was the New River Company's main put in?—I believe somewhere about the same period.

128. With regard to the ventilation of those subways, how do you find the ventilation?—We find no difficulty about ventilation.

129. How is it effected?—It is effected by a shaft in the centre of the subway, going up to the iron grating, shown upon these drawings, into the street; this model represents one of them; it is simply a brick shaft with an iron grating at the top of it.

130. At what intervals of distance do those shafts occur?—They are at various distances in different places, but they can be multiplied to any extent; in fact, we are now preparing two ventilating shafts to serve as a kind of refuge for a long crossing, and for ventilating shafts and lamp posts for the Southwark new street.

131. On the surface?—Yes, on the surface, to stand up at each end of the street; but the intermediate ones show simply a grating.

132. We have spoken of ventilation. Now, with regard to light, what sort of

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of light do you get there?—The ventilating shafts throw a light for some distance from the shaft.

133. The Committee can judge that for themselves when they go and see it, I suppose?—Certainly.

134. It would be better of course that they should see the Southwark Subway, which is a longer one than the Covent Garden?—Yes, the Southwark one is much longer.

135. The Covent Garden Subway has this advantage, that the pipes are actually laid, has it not?—Yes.

136. *Chairman.*] We cannot see the pipes, can we?—Yes, you can see the pipes; the soil is only just laid over them; it is easily removed.

137. Mr. *Phinn.*] You have spoken of those subways which you have constructed. I will ask you now as to those you intend to construct under the embankments, and in the City; should you preserve the same dimensions?—No, we should vary the dimensions a little in those.

138. In what direction; larger or smaller?—We should make them larger.

139. I suppose you find, year by year, an accumulation of different works and operations connected with them under the surface?—Yes, the occupation of the ground under the streets is very rapidly increasing.

140. You have rather a formidable one lately introduced; the Pneumatic Despatch Company, have you not?—Yes, we now have underground railways, pneumatic dispatches, and telegraph wires, all of which we had not formerly, and whilst these means of communication undergrond are increasing, the traffic overground is also increasing, so that stoppages become more inconvenient every year.

141. Leaving it to my learned friends to go through their detailed objections, you have considered the objections started in the petitions, with respect to gas pipes, first of all?—I have.

142. Do they suggest increased difficulty in working, and increased chance of explosion?—Yes; but I should say that there can be very little doubt that there must be a decrease of the cost of working; it will be a saving to the Gas Companies; and I cannot conceive that the risk of explosion is increased at all.

143. They have to pay, now, the expense of breaking up the streets, have they not?—They have.

144. Considering the number of applications we have heard of, that cost must be a formidable sum?—Yes; and if the Committee should go, shortly, to see the subway in Southwark-street, they would have an opportunity of seeing, in Stamford-street, the inconvenience to which the public are subjected, by the breaking up of streets to lay down gas pipes; I drove over it this morning; the street is cut up to a large extent; and though it is not one of the most crowded streets in London, it is, nevertheless, exceedingly inconvenient to get along there; I speak of Stamford-street; it forms a continuous line with the new street which we have just made.

145. We have all experienced those hindrances, more or less?—Yes; every one, I fancy, must have experienced great inconvenience arising from it.

146. With regard to facility of inspection during the progress, and after the completion of a work, do you think that would be diminished or increased to the various Companies?—I think the facility of inspection would be greatly increased during the construction of a work; and any slight defect would be readily detected. It is proposed to have persons in charge of these subways; and to let them examine them from time to time, and to keep up a regular supervision.

147. Is there any reason why one of your men should not detect an escape of gas in a subway just as well as any gentleman may detect it in his own cellar?—Just as well, and just as readily.

148. As to working in the dark, they seem to think that the men will be terribly puzzled to work in the dark. If they take a light, they think there will be an explosion; and if they do not take a light, they think they will be left in the dark?—I see no difficulty in the world in taking a light, and working by artificial light.

149. We know there are safety lamps in the world, if they choose to have recourse to that precaution?—Yes; and there are various other means of safety.

I have

I have a method, which can be shown to the Committee, which would entirely remove any chance of explosion.

150. Supposing that the ordinary coal mine safety lamp were used, even if there was an escape of gas, would the gas be inflamed?—No, I think not; I did not quite understand you before.

151. The same precautions which are used in mining operations might be resorted to down there, might they not?—Yes.

152. And the danger would not be one-tenth as great?—No, certainly not.

153. With regard to the water companies, do you think that it would be also an advantage to them?—I think it would.

154. They say that if they got too close to gas pipes, there would be an escape, and that their water would be damaged; is that rather far-fetched?—I think so; I cannot conceive how it could be so.

155. Now, in point of fact, there is this difficulty, is not there; the soil is completely impregnated with gas, over which the water pipes have to be laid?—Yes.

156. So that if there is a strain or looseness in the joints, the continual presence of gas in the soil may affect the water pipes?—Yes.

157. You would separate them by some interval, I suppose?—Yes, they would not be surrounded with soil, impregnated with gas in that way, and therefore they would be less likely to be affected by the gas.

158. They say the difficulty would be to connect them; that would be common to gas or water. If you wanted to put in a cross pipe to run at right angles to one of your subways, do you think the operation would be a difficult one?—No, I do not think it would be at all difficult.

159. Looking at all the advantages compared with the suggested disadvantages, do you think it desirable that this regulation should be imposed upon these companies?—Yes, I think that no disadvantage can be shown, except the theory that there is danger from explosion from gas, and I do not think that that is a well founded objection, therefore, I think it is entirely gain to all parties.

160. Of course, if the gas and water companies are not forced into these subways, it is of no use your going to Parliament for power to construct them, or your constructing them?—Certainly.

161. If they are not to be used, it is so much money thrown away?—Yes, it is money thrown away.

162. Therefore, it becomes desirable, at this period of your operations, when you can show them actually constructed, and when you are preparing to construct more under the authority of Parliament to have the opinion of Parliament upon the matter?—Certainly.

163. Did you go to Paris with reference to these inquiries?—No; not with reference to these inquiries; I was in Paris last summer, and I made it my business to go and examine the subways there for my own information. I saw the mode of construction; I saw where one gas pipe was laid in one of the sewers.

164. Where was that?—In one of the sewers; or partially a sewer and partially a subway, going up to the Louvre.

165. By the Place Carousel?—Yes; by the Place Carousel.

166. Was that a subway, in the strict sense of the word?—No.

167. What was it?—It was an egg-shaped sewer, with a little shelf projecting on one side, to enable persons to walk along the side of the sewage, the sewage being at the bottom, and the gas pipe was fixed at the top of this subway.

168. Their subways differ in construction from ours?—They have but two, properly so called, subways, one is in the Boulevard de Sebastopol; that is the principal one.

169. That is the new street, the Boulevard de Sebastopol?—Yes.

170. Is that constructed in the same manner as your own?—No; it is constructed, as I have described, with a large roadway upon either side, the sewage forming an open trench in the centre; the water pipes are raised on brackets.

171. I believe that since you were there, Mr. Hemans and Mr. Bramwell, at the desire of the Board, went there and investigated most minutely into the subject?—They went over on purpose, and went most minutely into the subject; they will describe it to the Committee more fully than I can.

172. Those gentlemen will be able to give the Committee the details?—They will be able very fully to explain everything connected with it.

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Cross-examined by Mr. *Burke*.

173. You say you saw in Paris one gas main in one of their subways?—Yes.

174. What length was that subway where you saw the gas pipe?—I cannot tell you the length of the subway; it passed through the Boulevard de Sebastopol up to the Louvre.

175. Can you give me any approximation to the length of the subway where you saw the gas pipe?—I saw it at the end of the subway.

176. Can you give me any notion of the length through the subway within which this gas pipe was laid?—No, I cannot.

177. It was the one only subway in Paris in which you saw a gas pipe?—It was.

178. Will you undertake to say that one cubic foot of gas passed through that gas pipe?—I have no doubt of it; I will not undertake to say it.

179. Will you undertake to say, that though there was a pipe, any gas passed through it?—I will not undertake to say it, but I have been informed on good authority that there was.

180. Will you give me some information as to your authority?—It was the gentlemen who went over to inquire into the subject.

181. We shall hear it all from them, I suppose?—Yes.

182. You cannot undertake to say, though you saw the pipe, that there was passing through it one cubic foot of gas; was that an old or a new subway?—An old one.

183. How is it in the new ones; are there any gas pipes there?—The engineers in Paris, like ourselves, are only feeling their way upon that subject.

184. You tell us that in the old sewers they had felt their way, yet they have put in new sewers since and you do not find a gas pipe in them; how is that?—I believe it was that they were under the impression that an explosion had taken place many years ago from that gas pipe, but they have been shown to be in error in so supposing, I believe.

185. With respect to Paris then, it appears from your evidence that there was an old sewer in which a gas pipe existed, but through which you cannot say that any gas passed; and the Paris engineers, with the experience they have had with the old sewers, have not put a single gas pipe in any of their new subways?—No, they have not.

186. *Chairman.*] I understood you to say that there was a gas pipe in the Boulevard de Sebastopol?—No; water pipes are put in there.

187. Mr. *Burke.*] May I gather from your evidence, that from your communication with the Paris engineers, their opinion is adverse to the laying of gas pipes in the subways?—I am not aware that it is adverse; I believe they are anxious to obtain experience; they proceed cautiously.

188. How long has this subway been in existence?—The subway under the Boulevard de Sebastopol is of recent construction.

189. I speak of the one in the Place Carousel, where the gas pipe was; how many years has that been in existence?—I cannot say the number of years.

190. A good many, is it not?—Yes.

191. We know that in Paris they go a-head with improvements; they have had time enough for considerable experience, and they have made inquiries for some years, and they are still at the present moment averse to laying gas pipes in the subways?—No, I do not think that is a correct way of putting it; they are not averse to it.

192. They have not laid any since, practically?—They have not in their new subways.

193. If your view is correct, the laying of gas mains in the subways will be as beneficial to Paris as to London, will it not?—Unquestionably it will, and it will be used in Paris in course of time.

194. You do not think that the Paris engineers are quite alive to its advantages?—There is always a prejudice against the adoption of anything new on the part of the engineers, who are responsible; they go cautiously, and they are quite right in so doing.

195. We cannot agree as to its being new, because the engineers appear to me

me to have had the experience of many years in Paris. Now, supposing that a gas pipe were to break in one of those subways, the amount of gas emitted would be a very large quantity, would it not?—Yes.

196. And the admixture of that gas with six or eight parts of atmospheric air in proportion to the gas would at once, if a light were admitted, cause a violent explosion, would it not?—I cannot conceive a gas pipe breaking.

197. Did you never hear of a gas pipe breaking?—A gas pipe may break when it is subjected to some violent shock, not otherwise.

198. Let us suppose the possibility of a gas pipe breaking or of there being an exudation of gas from a gas pipe, at this moment gas which escapes finds its way into the circumjacent soil, and there is no explosion?—You cannot detect the leakage; the soil becomes saturated with gas, and it may give rise to explosion.

199. Is it not the case in 99 cases out of 100 that if there is an escape of gas, either from a joint or in consequence of a fracture in a gas pipe, that escape finds its way into the earth adjoining and involves no explosion unless it finds its way out of the earth?—Yes, it does. When a gas pipe breaks in the soil the gas very frequently saturates it through, and gets into the house drains and the sewers, and explosions take place in consequence, because, of course, nobody is prepared for it, and there is no ventilation.

200. Do you not know that in a variety of the cases which have been referred to here of breaking up of streets, the great multiplicity of those cases arises from escapes of gas where there is a slight odour from which it is known that an escape exists, and where it is remedied at once?—That really is the great advantage of placing gas pipes in subways rather than in the soil, because in the soil the leakage takes place for a long time, and it saturates the ground and finds its way to a considerable distance from the pipe without being detected; whereas if the pipe is in a subway such as we propose here, it can be inspected from day to day and an escape will readily be detected; the gas will not accumulate and the mischief will not arise.

201. If the escape takes place in the soil, without being detected, I apprehend it cannot be to any very deleterious extent?—It is very deleterious.

202. If it is not sensible to the smell, it cannot be very liable to explosion?—Yes, as I have before stated, it gets into the cellars, and into the sewers, and many men have been blown up. I have myself, in passing through a sewer, many times discovered gas in the sewer when it was not ventilated. I have had to blow out my lamp, and grope along in the dark, in order to prevent an explosion taking place. We have lost a good many men by that.

203. Has not that been from other causes, such as foul air in the sewer?—No; I mean from gas.

204. If an escape of gas should take place in a sewer, so as not to be sensible to the nose, that escape of gas is not such as to be subject to explosion; if it escapes into a house, the parties are immediately sensible of it, and are able to remedy it, are they not?—Not always.

205. In the great number of years that have elapsed since the introduction of gas, with the exception of that fire, for it was not an explosion, in Bread-street in the City, to which, reference has been made, the explosions have been exceedingly minute, and such as not to occasion damage to any large amount, have they not; no serious case has come before the public?—There have been very many cases of explosions.

206. Can you indicate any case of an explosion, in which a large and serious amount of damage has been done?—I am not prepared to name one at present

207. On the other hand, if a large escape takes place in a subway like yours, and a light is applied, by accident or otherwise, might it not have the effect of blowing up the whole street at once?—No; I think not.

208. Do you know the explosive force of a given amount of gas, mixed with a given amount of atmospheric air?—Yes.

209. What amount of gas, mixed with six or eight times the amount of atmospheric air, would be equal, in explosive force, to a ton of gunpowder?—I am not prepared to state that.

210. It is a fact, is not it, that gas confined in such a place as your subway, for instance, would have a very large explosive force?—I do not admit that it would be confined, nor would it be dangerous with proper ventilation.

211. Supposing the explosive force were simply sufficient to cause a disrup-

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tion of the joints of the other gas and water pipes in the subway; would not the result be disastrous if the explosive force were only sufficient to lossen the joint, and let out more gas into the subway?—No, I think not; because any such explosion as that would immediately blow out any light that was in the subway.

212. The moment after the light was blown out, the gas would be going on escaping through the other broken pipes to an enormous extent, would it not?—Yes; but there would be no light there.

213. There are service pipes from here (*pointed to the Model*), are there not, to communicate with the areas of the houses?—Yes.

214. Supposing an escape of gas, which passed through those service pipes into these areas, there being an escape at the same time in the tunnel a maid servant going into the area with a candle might blow up the whole tunnel, might she not?—No doubt, if it is full of gas.

215. So that constantly the public would be subject to that contingency. There might be an escape of gas going on in the tunnel to a large amount, and although precautions might possibly be adopted against bringing a light into the tunnel, at the same time, there would be a communication by those service pipes into the areas, which would lay the whole open to the risk of accident from a careless maid servant?—No; I think that the gas pipes in the subways are not subject to those casualties. There is an opportunity of examining them from time to time; and, therefore, probably the number of such explosions would be greatly reduced.

216. The fact is, that if there is an escape going on into a cellar from a service pipe with a defective joint, whatever precautions you might take in the subway, if a light was applied in the area, you would have no control over it; it would communicate to the whole quantity of gas in the tunnel?—That supposes a very improbable state of things; that a person hearing an explosion would be so much frightened at the explosion of gas, that they should run with a light to set fire to it; it is rather a strained idea.

217. This is the Report of Sir William Congreve upon the Gas Light Establishments of the Metropolis: "The effects of the explosion of gas in the stove for drying timber in the Dockyard at Woolwich, which happened some years ago, and which I had an opportunity of examining immediately after the accident, were certainly much greater than those which I have seen produced by the explosion of one of the drying stoves for gunpowder in the King's works, containing 40 barrels of gunpowder?"—I do not remember the words of that report.

218. I suppose you admit that those pipes in the subways would require repair from time to time?—Yes; they would require to be watched, and probably painted or coated.

219. And for the purpose of those repairs, the workmen must, of course, be supplied with lights?—Yes.

220. You spoke, I think, of their using the Davy Lamp or something of that kind?—Yes.

221. Even notwithstanding their using that Davy Lamp, we hear of explosions in the mines, do we not, constantly?—Yes; no doubt resulting from an improper use of it.

222. In addition to that, there is a danger which there would not be in a mine; do you not know that the joints of those pipes are cemented by means of lead?—Yes.

223. And that that lead is molten on the spot?—Yes.

224. For which fire is used?—Yes.

225. How do you propose to guard against that?—If you will allow me, I will show you that; there are a variety of ways in which that difficulty would be overcome. I will just suggest one for the consideration of the Committee which I think completely overcomes it: there are various modes in operation at this time of making joints in gas pipes, by means of bladders and other expedients, which may not be considered, possibly, as perfectly effective, but I think that this will be so (*producing a Diagram*). That represents the subway. I propose to have something like a diving-bell in the subway; this should fit round the pipes, and from the ventilating shaft a gutta percha tube would be brought into the diving-bell, and another would be brought out of it in that way; and a man working a fan at this point, would keep a current of air constantly flowing through the chamber and out again into the open air. The light would be outside; he would have plenty of light to work by, and no communication could take place between

between the point where the operation was being performed upon the joint and the subway itself.

226. You have been pressed, have you, with the necessity of making some provision against that application of fire?—No, I have not. I do not believe that it will ever be necessary to use that method; but I thought it desirable, knowing that a variety of objections would be raised here, to point out one method that occurs to me at the present time of getting over that objection.

227. In order to prevent this explosion which might take place in consequence of the necessary application of fire in cementing the tubes, the public are to have this new invention of the diving-bell, and if the diving-bell should answer, they will be saved from being blown into the air; but, if it does not answer, they will run a great risk?—No; that is not my idea at all.

228. At all events, this diving-bell is to be the mode by which the pipes are to be hereafter cemented?—That is one way of doing it.

229. Let us go now to the ventilation of those shafts. Your present Southwark and Covent Garden Subways are of comparatively short dimensions, are they not?—The Covent Garden Subway is short.

230. May I put to you also that those subways are not yet built upon on each side, are they?—In Covent Garden it is.

231. Are they built on, on both sides?—A good part of the way.

232. All the way?—I think there is only one corner where there are one or two buildings wanted.

233. It is a short distance?—It is 328 feet long.

234. That is not fully built up on each side?—Very nearly.

235. What height are your shafts to be above the ground?—The shafts which I am speaking of are at the Southwark new street.

236. Are there no shafts then, in the Covent Garden Subway?—No.

237. What may be the height of those shafts that you have adopted, or which you have proposed to adopt?—They are about 20 feet high.

238. What length in the subway are they proposed to ventilate?—About 100 feet.

239. Are we then, at every 100 feet, to have a chimney standing up 20 feet high?—No; those ventilating shafts, as shown in the drawing, would be formed at every 100 feet.

240. Is it a chimney above the surface of the ground 20 feet high?—No; that is the height of the two; one at each end of the street.

241. What is to be the manner in which these intermediate ventilating shafts are to be constructed?—It is shown here (*pointing to the plan on the wall*); there is the shaft, with the iron grating upon it, which is simply seen just as you see the sewer ventilators.

242. What I want to know is, whether the shaft is to rise above the surface of the ground?—No; carriages can drive over it; the shafts which I describe, at each end of the street, are to be ornamental lamp-posts, and to answer a threefold purpose.

243. Is this hole, with the grating, to be in the middle of the street?—Yes.

244. You do not mean to have lamp-posts in the middle of the street, do you?—No; I stated that what I proposed was, at each end of the Southwark-street to erect a ventilating shaft, to answer a threefold purpose, viz.: that of a refuge for passengers crossing the street, to hold lamps for lighting the crossing, and for ventilation.

245. Is that system to be carried out throughout London, to have lamp-posts in the middle of the streets?—It is necessery, whether there are those ventilating shafts or not, where there is a long crossing, for a refuge for the passengers.

246. For the sake of ventilating those subways, are you to have ventilating shafts, 20 feet high, rising up in the middle of the streets?—We are to have a number of ventilating shafts like those shown upon the drawing (*pointing out the same*).

247. Upon the flat?—Yes.

248. Do you represent that you will be able to ventilate those tunnels with a slight opening like this?—Yes, I have no doubt of it.

249. Do you conceive that openings like that will light the subway?—Yes, they will light the subway for some distance from the shaft.

250. We all know, from passing through railway tunnels, to what extent the shafts light the tunnels: it is a very small area around the bottom of the shaft

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that is lighted, is it not?—The Committee will see if they visit the tunnel. I propose, however, to use artificial light in the tunnel.

251. *Chairman.*] You propose to use artificial light in part?—I do; the drawing which I have shown you shows a strong lamp shining upon a man at work there, to give him abundant light.

252. Mr. *Burke.*] You told us, I think, that you propose to adopt larger tunnels in the City than those adopted here?—Yes.

253. Are you right in giving us 3 *l.* a foot as the cost of the subways constructed now?—Yes.

254. Then, I do not quite understand the report handed in here, which is called a memorandum of the estimated cost of making the street, dated 30 December 1863; it professes to be a memorandum by the superintending architect, as to the estimate of the actual cost of the street; and it goes on to give the total length of the street as 3,450 feet, or about two-thirds of a mile; then I find it stated that for the Southwark-street the excess of actual ever estimated expenditure caused by the formation of subways amounts to 37,627 *l.*, the estimated cost in 1857 being 519,424 *l.*, and the actual expenditure up to December 1863 being 557,051 *l.* The excess of actual expenditure is stated here as having been caused by the formation of a subway not originally contemplated?—You have not quoted that quite correctly, I think.

255. Certainly, there is the building of the vaults too?—Yes, that is what I mean; I will put it right in a moment; that means simply building the vaults and subway together. I have given 3 *l.* a foot for the building of the subway, and the actual cost of it was 2 *l.* 15 *s.* a foot.

256. We work this out as 10 *l.* 18 *s.* a foot?—You have taken the cost of the vaults as well; the vaults are charged to the houses; they are built in the first instance by us, and charged to the parties who take the houses.

257. Do you mean to tell me that the vaults have cost 7 *l.* 18 *s.* a foot run, and your subway only 3 *l.*?—I think it is very probably that that is so.

258. Do you undertake to say that that is the case?—I will not undertake to say so; I will undertake to speak to the figures which I give you of 2 *l.* 15 *s.* a foot run as the cost of that subway.

259. I find it stated, that the cost of the subways is repaid by the persons taking the building frontage?—Yes.

260. Then you give us for the subway 3 *l.* a foot run, and for the vault 7 *l.* 18 *s.*?—I stated as the average for the subway 3 *l.* a foot run.

261. And the vaults, 7 *l.* 18 *s.*?—Mr. Marrable, the late superintending architect of the Board of Works, will be giving evidence presently, he will speak to his own figures; I have no doubt that if you quote it correctly, it is right; that seems a very probable amount, considering that there are vaults on both sides.

262. Then the City works are to be still more expensive, are they?—Yes, probably.

263. Have you made any calculation of the cost to which the Gas Companies and the Water Companies will be put by removing their pipes?—In new streets, they will not have to remove their pipes at all.

264. You know that by the powers of this Bill, you are seeking to compel the Gas and Water Companies to remove their existing pipes at their own expense. They having laid them down at their own expense already, they are to remove them at their own expense, and put them in the subways; and having done so, they are to pay you a rent for the use of the subway, that is your proposal?—It is the proposal in the Bill.

265. Now, I ask, can you give me any estimate of the cost to which the companies will be put by that process?—I have not made an estimate, because we do not construct any subways in old streets; our present and contemplated subways are all in new streets; they are a saving to the company to a very considerable extent.

266. Are you willing to confine the powers you take to new streets?—All I can say is, that the question not having arisen, I have not formed any estimate of what the cost will be.

267. Are we to understand that the Bill is to operate with reference to new or to existing streets?—Both, I think.

268. Then we will deal with the existing streets. In an existing street where a Gas or Water Company has laid down, by authority of Parliament, at great expense, its existing mains, what expense will it be put to under the clauses of this

this Bill in the removing of those mains?—I do not know; I cannot give you that.

269. You know, do you not, that the removing of the mains would be a source of considerable expense to them?—Yes.

270. You know, do you not, that if they took up the mains which are quite sufficient for their present purposes, they might not be serviceable again for laying down in the subways?—No, I do not think that.

271. Supposing a pipe had been down for some time and had become partially corroded, would you recommend the Company to lay that down in the subway?—No.

272. Therefore, they would have, in such a case, to substitute a new pipe for an old one, though the old pipe might be good enough for the purposes for which they at present require it?—Yes, they would substitute a new one, if it was defective.

273. You can give no estimate of the cost to which they would be put?—No.

274. You propose that they should undertake it themselves?—Yes, subject to an appeal.

275. That is a very beneficial enactment, that the Company shall be compelled to do it at their own expense, and after doing it, instead of being, as they are now, free from any present expense, they shall pay you a rent?—Yes, I think a rental is fair, because it would amount to little more than the cost of superintending their old pipes and repairing them, and they would save a very large amount upon the loss of gas which takes place at present by leakage.

276. Do you not think that the Companies are tolerably good judges of their own interests as to whether they would save expense or not, and that they might be left to that instead of being compelled to save expense by your Bill?—No doubt they are good judges; I have no doubt they do not approve of being asked to pay a rental.

277. Supposing the Companies were to be compelled to take up the existing mains and to lay them down in the subways, how would the public be supplied with gas and water in the meanwhile, while the process was going on?—That might be done, because in most streets there is not only one gas company's main but there are two or three.

278. Pardon me, you know that Parliament has now districted London and confined each company to its own district; take the case of one company having its main in the same street with a water company, you want them to pull up the mains; where is the gas or the water to be got from in the meantime?—I suspect that the cases where there is only one gas main laid in the street are very rare indeed.

279. We will deal with a possible case; you do not mean to say that every company has two mains in every street, do you?—No, not in every street.

280. You do not seem to have an answer to that difficulty?—I have no doubt that means may be found to get over that difficulty which you have suggested. I cannot say that any particular way occurs to me at the moment.

281. You seem to justify this Bill by your answer, by saying that if a subway is made and not used by the Companies, the money which was spent for making it is partially thrown away; that is your justification for compelling the companies to pay you for this outlay, you are compulsorily calling upon existing companies, who are satisfied with their existing position, under Acts of Parliament, to pay you for the expense that you have been at in making the subways?—No, we do not ask them to pay the expense.

282. Whether they pay it in the shape of annual rent or as a capitalised sum, it is as broad as it is long, is it not; what distinction do you draw?—It has not been our proposition to make the payment equivalent to the expense of the formation of the subway; but it is a payment equivalent to the advantage they would derive.

283. I understand my learned friend, Mr. Phinn, in opening the case, to say that you look to us to pay the interest upon the outlay and for the maintenance?—I believe, he said that it would not exceed that.

284. You are not to make us pay the interest upon the outlay and the maintenance, and put a little money into your pocket besides; but your proposal is to execute these heavy works, and to put us to the enormous expense of taking up our pipes and putting down new ones, and then we are to pay you the interest upon the money you have expended and the cost of maintenance; that

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is what you propose, as I understand, from my learned friend's opening?—No; that is not what we propose.

285. Can you give me any case, in your experience, of any such attempt having been made before by any great body in the kingdom; do you know any precedent of an Act of Parliament at all to be compared to so outrageous a proposal as this?—I do not know of a precedent, for these are the first subways.

286. You have had a great deal of experience, and, I dare say, you have considered at the Board how you would support this Bill?—I cannot give you experience of subways already constructed, because it is a new thing.

287. Is your Southwark Subway constructed partly through peaty ground?—Yes; part of it.

288. Is it liable to settlement?—No.

289. Not if heavy weights are put upon it?—No.

290. Is not peaty ground liable to settlement?—We have gone through peaty ground; but we have founded our work, in all cases, upon a solid foundation with concrete, so that there can be no settlement.

291. Where the mains would lie would there be peat or not?—No; it is all on solid concrete.

292. This bill having been considered by the Board of Works, are they prepared to put a clause in to the effect that in case of any accidents arising they will bear the cost?—I do not know what they would be prepared to do. I do not think that it would be desirable that they should put in such a clause.

293. Supposing an explosion of gas took place from the breaking of a main of a Gas Company, at present, the Company would be liable; do you mean that the Company shall be liable after having been compelled to alter the position at your instance, or who would be liable?—I think the supervision of the mains should rest with the Companies.

294. Therefore, you would compel us to alter our position with which we are satisfied, to adopt a position with which we are dissatisfied; and, in case such an accident arises from it, as we tell you will be very likely to occur, we shall have to pay for it, and not you?—I think, if there is an accident, the Gas Company should pay, for the maintenance must rest with them.

Cross-examined by Mr. *Toulmin Smith.*

295. You mentioned that you had let the contracts for making the subways under the Thames Embankment, did you not?—Yes.

296. Separately from the other contract?—No.

297. There are not separate contracts for the subways?—No.

298. I suppose you have calculated the amount of the cost of those subways?—Yes.

299. What is the cost at which you have calculated them?—Somewhere about 3 *l.* a foot.

300. What is the size of those subways there?—They vary in dimensions. I have drawings of them here (*producing some Drawings*); they vary in shape in some cases, and the structure is different from that in Covent Garden; these subways would not be more costly than those in Covent Garden, because there is no excavation for the embankment subway.

301. Would the sectional area be about the same?—The sectional area would be about the same; but it is a different shape, and a different formation altogether. The subway in the Thames Embankment would be formed behind the embankment wall; it would be about 7 ft. 3 in. in height, and 9 feet in width; it is formed over the low-level sewer; it forms the abutment for the wall of the Thames Embankment, and in that way strengthens it.

302. The cost of that subway will be less than the cost of that in the street in Southwark; because you have no excavation?—Yes, the cost of that would be less.

303. How is it that if the cost of the subway in the Thames Embankment is 3 *l.* a foot, the cost of this subway will only be 3 *l.* also?—I said, that the cost of the subway in the Thames Embankment would be about 3 *l.*; but it might be something less than 3 *l.*

304. Can you give us the details of those 3 *l.*, because the price varies a good deal from what we have it?—That is the actual cost; I have taken it out from the actual money paid.

305. You say that it is 3 *l.* per foot run?—Yes.

306. Does that 3 *l.* per foot run mean the actual frontage on each side?—No, it would be 1 *l.* 10 *s.* on each side; that is the actual course of the entire work.

307. Does that include the cost of the side passages?—Yes, it does.

308. I think you said that there is one of those side passages to each two houses?—Yes, one to every two houses.

309. This plan and report upon the proposed subways seems to represent four or five houses to each passage; but you have not adopted that?—No; there are about three of those vaults to each house.

310. Those are the vaults and not the houses, are they not (*pointing to a Plan*)?—Yes.

311. You spoke of a reference made to a body of scientific gentlemen in 1857; naming Mr. Robert Stephenson, Mr. Hawksley, Mr. Cubitt, and several others; did that body publish any report?—They did.

312. Will you hand it in?—I have already handed it in to the Committee.

313. Amongst the prizes given upon their award, there was one of 100 guineas, and another of 50 guineas, and another of 10 guineas, I think?—There were.

314. Can you show us the nature of the scheme for which the first prize was given?—Yes; I can show you the design (*producing a Plan*). That is a drawing of the first design; it is very similar in its character to what we are using.

315. Is the size the same?—The size is larger.

316. How much larger?—There does not appear to be a scale upon it; I do not know that I can tell you at the moment; I think I can get the dimensions pretty nearly (*measuring it.*) I see that it does not appear to be larger; it is 10 feet wide and about seven feet high; it is a different shape from the one which we have adopted, and there would be a little more area in it.

317. Yours is part of a circle, is it not?—Yes, a semi-circle; it has about the same area, in fact.

318. Do you consider that the design which you have adopted is a shape which would be more convenient for the packing of pipes than this?—Very much better, because this plan is defective in structure; it could not have stood as it is designed.

319. It has not the same force?—No; the abutment would have had to be made much stronger.

320. In making those subways, you must have made your calculations upon what the cost of the excavation, and brickwork, and other parts of the work would be?—Yes.

321. Could not you lay a short statement of that calculation before the Committee?—Yes; I can produce the actual cost. I have not it with me now.

322. Will you produce it another day?—Yes; I will produce the actual cost.

323. You have stated that the subway at Covent Garden, two pipes are laid down, one the pipe of the New River Company, and the other the pipe of the Equitable Gas Company; both those are 6-inch pipes, I think?—They are.

324. Are you aware that many of the Water Companies have much larger pipes than that, some even as large as 30 inches?—Yes.

325. What arrangements have been made for getting those pipes into the subways?—I have considered the subject very fully, and there are a variety of ways of doing it.

326. What is the way you provide, because you compel us to get in; how are we to get in?—At present, there is no provision to get in pipes of a diameter of more than 2 feet 6 inches.

327. This Bill proposes to compel us to get in, does not it?—Yes; I can show you a way of doing it upon the plan.

328. Are you aware that there are pipes as large as 36 inches in diameter in use within the Metropolis?—Yes.

329. Within the jurisdiction you wish to claim?—Yes; and if the numbers should become greatly increased, it would only be to enlarge the subways. I have here some designs to illustrate the subject (*producing some Designs*). There is a design for a subway of these dimensions, containing pipes of 3 feet in diameter, and 2 feet 6 inches in diameter; that is one arrangement.

330. How are they to get there?—By openings at the end of the subway.

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331. For pipes which are 36 inches in diameter and 12 feet long, what arrangements do you make; an opening at one end will hardly satisfy the conditions, will it?—There will be no difficulty about it; at the end of one of these subways it is simply necessary to have a staircase or an incline down to the end of the subway, to let the pipes in with a sufficient opening, covered either with an iron plate or a brickwork opening; there is no difficulty that I can see; it is having one opening to bring the pipes down, and lay them down there instead of opening the street all along, and that is an opening of a permanent character which opens by doors, just as you would open a door to let large casks down into a private cellar.

332. It is not usual to put into a private cellar a pipe 36 inches in diameter and 12 feet in length, and some tons in weight?—It is usual to put in casks of a much larger diameter than any pipes. The tunnel is 300 feet long, and therefore it is of course long enough to take the longest pipe that you can put into it.

333. What is the depth of those tunnels below the surface of the ground; they are 20 feet below, I apprehend, from the height of the shaft?—No; the top of the tunnel is about four feet below the surface of the ground, between three and four feet.

334. Practically, you have made no arrangements for putting in those pipes?—No, we have made no openings as yet; there is no necessity for it; it can be done any day.

335. Supposing you have got the pipe in, how will you get it to the place where it is to lie?—You can have trucks.

336. In this tunnel, which is already, according to your picture, choked up with pipes, where is the room for the truck?—No, it is not choked up in that picture; there are six pipes, and yet there is room for a truck to pass along the centre.

337. Is that taken from the actual state of facts, or from an ideal state of facts?—The actual state of facts as regards the dimensions, but a proposition as regards the putting in of water and gas pipes. I have had represented here two pipes of 2 feet in diameter, one of 1 foot 3 inches and one of 6 inches, and so on. I want to show that no difficulty can arise in that respect; all dimensions are given here.

338. You are not perhaps aware that the Chelsea Waterworks Company have four sets of mains in the same street?—I do not know what street you allude to.

339. However, you may take the fact from me, that they have as many as four mains to supply water, filtered and unfiltered, for different purposes. Supposing them to have put their pipes in, and supposing the Gas Companies and the Telegraph Companies to have got their pipes in, what would be the state of things when you wanted to get to the pipes to repair them?—If you will only tell me the number and size of the pipes, I will show you how there is plenty of room to get them in and to get at them to repair them at all times.

340. Could you get at half a dozen pipes of this large size?—Yes. I will illustrate that. Take Charing Cross, where the traffic is great and the street is wide too; it is just like the surface of a street; in streets of that kind, where the traffic is very great, you have a larger street; in some cases, where there is a larger number of pipes, you must have a larger subway. You must adapt the subway to the requirement of the pipes to be put in that subway, and they will be so constructed as to have an abundance of room for the pipes likely to be laid for many years to come.

341. Of course the cost increases proportionately to the size, does it not?—No doubt, and the number of interests benefited would increase in a still larger proportion.

342. What size do you propose for the subway in a street like Charing Cross?—I do not propose to have a subway there at present.

343. You will want to lay it down like a new street some day?—If so, then we shall consider what are the proper dimensions.

344. You wish, in fact, to take up street after street in this way?—I wish there were subways under all the streets now, because it would save the taking up of the streets.

345. My learned friend, Mr. Burke, asked you about the fracture of a gas pipe, and you said that that was improbable. If there were as many as 15 pipes in

in a subway of this kind, would not a gas pipe be liable to fracture?—I think not.

346. Not when there were men repairing the neighbouring pipes with their heavy tools?—I think not.

347. Taking it with the net work of service pipes, do not you think that there would be a very great risk of fracture?—I think not.

348. Is your experience of workmen such as to lead you to believe that they are so exceedingly careful that, under those circumstances, there is no reason to apprehend a fracture?—I know this, that with proper precautions we have interfered largely with gas and water pipes under different circumstances, and where we have not had the advantages which we should have here, and we have very rarely done any damage to speak of.

349. That implies that you have sometimes?—We have from causes which could not arise in the subways. The way in which gas and water pipes are injured generally is this: when we make an excavation we have to sling the gas and water pipes over a trench; they are secure as long as that is done, but when the excavation is filled in, however hard you may ram it, the ground will settle some months afterwards and that settlement forces the pipes down, and sometimes breaks the joints and creates a leakage; that would not occur here where the pipes are on a rigid foundation.

350. You proposed, as I understood, that they should be laid not upon the solid ground, but upon chairs?—Yes.

351. How are the chairs made solid?—It is represented there; there are a couple of chairs under each pipe.

352. What distance are they apart?—Nine feet apart.

353. Do you mean to say that pipes laid upon chairs 9 feet apart will have as solid a bearing as pipes laid upon well hardened and beaten ground?—Very much more solid.

354. They may be 30 or 36 inch water pipes?—Yes; even our cautious neighbours, the Paris engineers, do not hesitate to do so.

355. They do not like it, do they?—Yes, they do like it.

356. What is the size of their water pipes?—Generally, I think, a 30-inch pipe.

357. What distance are the chairs there on the brackets which you spoke of?—They are suspended there—at least, in some cases they are suspended, in others they have a long iron bar supporting them, that stands up. I think the distance between them is greater than I have named.

358. We have been told of a case where it has been found that one of your subways is based upon a peaty moss underneath?—No; I said we went through peat, but we never based the subway upon peat.

359. Are you quite sure of that?—Yes.

360. My information is, that there are about 100 yards in that condition?—It is a mistake. If we had done so it would very soon show itself in the road; we should have a settlement.

361. You mentioned the increase of the underground works as a reason for this measure, the pneumatic dispatch and the underground railways?—Yes.

362. Do you propose to make your subway large enough to carry an underground railway and pneumatic dispatch as well as those pipes?—No, we do not propose to do that; there is, however, no reason why a subway and a pneumatic dispatch tube should not be constructed together, with great advantages to both instead of separately.

363. Your argument is, that the pneumatic dispatch and these subways should be in the same street, otherwise there is no point in your illustration at all?—What I say is, that the ground under the streets is now very much more broken up than it used to be for the works I have named, and that they occupy so large a portion of the streets that it is desirable to combine them together under some uniform arrangement.

364. I say where they occur in the same street?—Where they occur in the same street.

365. Do you propose to have these underground railways and the pneumatic dispatch, and your subway in one street?—In the Southwark and Covent Garden Subways there is no pneumatic dispatch or underground railway proposed, but in the street to the Mansion House it is now proposed, and that proposition is about to be laid before a Parliamentary Committee, to construct

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underground railways, and the pneumatic dispatch tube, it is proposed to construct them in connexion with the subways.

366. Like the Thames Tunnel, side by side, I suppose, not in one great opening?—No; as one work.

367. What would be the size of that work?—It would have to be a space of some 35 feet in width.

368. Nearly the width of the middle of the street?—Yes.

369. How should you propose to do that; by girders, or by an arch?—By a brickwork arch.

370. What depth would you go to?—I forget what the depth of the proposed railway is.

371. You do not mean to say that you would go across the whole width of that broad street by one arch?—That street would be 70 feet wide; I do not propose to do so.

372. Would you propose 35 feet in one arch?—Yes, there would be no difficulty about it.

373. With respect to the vibration which would result in that case, do you not think it would be very great?—I think not.

374. Have you not passed under bridges often, and felt the vibration?—Yes, but I think that a work surrounded by solid ground, and built upon a solid foundation, would not be so liable to vibration as bridges over-ground.

375. There are many bridges built on two sides of a steep hill, or rock; they vibrate equally, do they not?—The vibration is reduced where there is solid ground all round.

376. You speak of the water pipes not being injured, in your opinion, by the gas; are you not aware that there is always water in the gas pipes, more or less, and that there are air tubes connecting with the large pipes?—Yes.

377. You know that now there is an outlet, by means of the air tubes, passing up into the open air?—Yes.

378. Must not those air tubes be in the subway?—They may be connected with great facility with the ventilating shafts; they may be placed outside the ventilating shafts; they could be carried up to them.

379. In the case of the spindles and other machinery, by which the men give us the water several times every day, they must be accessible?—They can communicate with the pipes direct by going to the subway.

380. The subway will be a daily thoroughfare to the waterworks people, then?—Not a daily thoroughfare; it will be open to all parties who have charge of the waterworks to go into it.

381. You spoke of the shafts; those shafts, I understood you to say, were 20 feet high; you stated, in spite of that, that they were only level with the surface of the ground?—I can explain it to you upon the plan.

382. *Chairman.*] I understood that there were certain shafts at certain places, and at other places not shafts, but openings?—Yes; it is simply that at the end of a wide street with a crossing; it is necessary that there should be a refuge for people to stand, and let vehicles pass them, and there must be light at the same place, and there must be a ventilator; we propose to put a lamp according to that pattern. These shafts answer the threefold purpose; they are not erected yet; but that is the design.

383-4. Mr. *Toulmin Smith.*] Then it is in the nature of a great lamp-post?—It holds a lamp, and serves as a refuge to persons crossing the street.

385. It is at a crossing, you say?—Yes, at the long crossing at the junction of the Blackfriars'-road, for instance.

386. How far are those apart?—There is one at each end of the street.

387. What distance would that be?—I think 3,000 and odd feet.

388. At every short distance there will be those gratings?—At every 100 feet about.

389. Do you think that that would give sufficient ventilation?—Yes, I think it would; if not, there would be no difficulty in increasing the number.

390. Have you considered that the air in the subways will always be colder during the greater part of the year than the atmospheric air?—No, I think not; but I think it will be more uniform.

391. Will it not be sometimes cooler?—Sometimes cooler, and at other times warmer.

392. Have you considered the effect of that upon your ventilation?—I know that the same thing applies to sewers, and we get perfect ventilation by those openings we have now; therefore, I am quite sure we shall get it here.

Re-examined by Mr. *Phinn*.

393. Applying your experience, derived from your main sewer, which you have constructed, do you think that the ventilation of these subways will be very formidable?—I am quite sure there will be no difficulty about it.

394. With regard to vibration, the Committee can judge for themselves when they go down?—Yes.

395. Mr. *Toulmin Smith*.] If you have a very heavy cart over it?—Which, no doubt, we shall.

396. With regard to the difficulty of supporting those mains, my learned friend has put to you the case of six mains of 36 inches in diameter; they must have gone to some exceptionable part of the world for that?—I think that is a very extreme case.

397. You distinguish between subways under new streets and subways under old streets; the subways under new streets you mean to make, of course, immediately available for these water pipes?—Yes.

398. With regard to the subways under the old streets, you cannot construct them without coming to Parliament first?—No.

399. Therefore, the contest upon the present Bill is for subways under new streets?—Yes.

400. One is actual and the other prospective?—Yes; Parliamentary sanction would have them to be obtained for the old streets, and we should have to answer all the points that might be raised upon such an inquiry.

401. Applying your mind to new streets, you do not see any great hardship in gas and water companies having to lay down their pipes in your subway?—No; I think it will be a saving to them.

402. The sensible companies, the Equitable Gas and the New River Companies have laid down their pipes in the new street?—Yes.

403. You might have a difficulty from one company not being so sensible and not doing it?—Yes.

404. My learned friend, Mr. Burke, was good enough to ask you about Sir William Congreve; I do not know whether you ever saw the report to which my learned friend referred of 1823, but I find here, "It appears that in some of the gas works safety lamps on Sir Humphrey Davy's plan are used on the premises to guard against accidents that might occur by the application of flame to any explosive mixture that may have been formed by leakage from the gas-meters or pipes;" does that practice of the gas companies, in their own works in 1823, justify you in suggesting the safety lamp now if necessary?—Yes.

405. My learned friend asked you about the details of explosions; I find the details of an explosion in the cellar of the Opera House given before a Parliamentary Committee by Sir William Congreve, and it appears that the wine even was not disturbed?—I do not remember that case.

406. There was a Committee to inquire whether they were to allow those Gas Companies, which had been formed without the sanction of an Act of Parliament, to go on?—It will appear in that report, no doubt.

407. *Chairman*.] Have you power to make subways now in old streets?—We have only power to make the subways that we have made. We have to apply to Parliament for power to make each particular subway. We have obtained in three different Acts the power to make three different subways; but then, we have not the power to make the Companies use them; therefore, although the subway is made, it is comparatively useless.

408. Mr. *Phinn*.] You have been asked as to the liability to fracture of those pipes in your subways; in the first place, they will lie upon an equal and hard foundation, will they not?—They will.

409. Therefore, they will not be liable to depression arising from the subsidence of the soil?—They will have no weights upon them, and no chance of subsidence.

410. There will be inequality of support; it will not be varied?—No.

411. At present my learned friends say that a great number of these applica-

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tions for opening the streets arise from fractures; that shows that the present system is not a very good one. You think your system will obviate the liability to fracture, do you not?—I do.

412. With regard to damages for accidents, you do not propose to make the Board responsible for an accident, if it arises from the negligence of the Gas Companies' servants?—No.

413. You would not offer a premium to negligence?—No; I should propose that they should have a proper power of supervision over their own pipes; and they must have with that the responsibility. I think it would be very dangerous to remove that responsibility from them; it would make them very careless, and accidents would be more likely to arise.

414. With regard to the old streets, my learned friend says that you have no provision for carrying on the supply, whilst the transit of pipes into your subway is taking place. Do you know that in many cases these Companies have taken up whole streets of pipes in London?—Yes.

415. They made some provision whilst the work was going on?—Yes, in that case, I believe they used the old pipes for the time being, and laid down a fresh set of pipes; that is an obvious way of doing it; but, no doubt, other means might be devised of using the pipes at the same time.

416. They might use the old pipes, putting fresh pipes down in the subway, and then they might use those pipes which had lain there during the construction for another portion of the subway, or another street?—Yes. I am quite sure that there are many modes of doing it.

417. Do you remember that in the City, the City of London Gas Company worked day and night for some time during a removal, so that, although whole streets were removed, they provided for the supply of the gas in the meantime?—Yes; they gave a temporary supply of gas.

418. *Chairman.*] Am I right in saying that you are not at all prepared with any estimate of the expense that the Companies will be put to in running their pipes and paying you?—I am not prepared to state that.

419. Mr. *Phinn.*] That would apply to old streets?—Yes, in the case of laying pipes for the first time in subways, and I maintain that the saving to the Companies will be very great, and that the cost of maintenance will be decreased.

420. *Chairman.*] Have you any estimate to show that?—I have not; but I apprehend that it is obvious that if there is no excavation, and no shoring up, that amount must be saved; there is simply the cost of putting the pipes into a subway.

421. There is another question that affects the Companies, whether the expense of the subway, or the rent they pay to the Board for the subway, would be less than the expense they are put to at present in repairing?—That is a point that might be fixed upon; the maximum amount might be fixed by the Act.

422. You have no idea at all upon that subject yourself, have you?—My own idea was to make a small payment to cover superintendence; my idea never was that they should pay for the whole cost of the subway.

423. Or the interest of it?—Or the interest of it. I think if the Companies pay for the maintenance, the public will have constructed the subway, and will derive a great benefit from that subway; and, therefore, the expense would fall upon each to some extent; the exact amount I am not prepared to fix; I have not fixed it in my own mind.

424. Your opinion is, that the Board of Works ought to pay for the subways, and then that the Companies ought to pay for the maintenance and the supervision of your works and the pipes?—That is my idea.

425. Is that the idea of the Board, do you know?—No; I do not know what the idea expressed in the Bill is; the Board have not, I think, expressed an opinion upon that subject.

426. *Chairman.*] The maintenance, if it were well done, would not be a large amount, would it?—I think it would not be great; it would require constant supervision. I think each length of subway should have a person responsible for it.

427. Your works would not require constant supervision, but the pipes would?—I mean the pipes, of course; our work would not.

428. You spoke of this new railway which is in Parliament; have the Metropolitan Board of Works anything to do with that, in reference to the subway; are

are they going partners with the railway?—If the railway is constructed under their new streets, the Railway Company will undertake to do the work according to plans to be approved by the Metropolitan Board of Works, and under their direction and supervision; so that, for the convenience of the public, the two may be executed as one work. *J. W. Bazalgette, Esq.* 6 May 1864.

429. The Metropolitan Board of Works will pay a proportion of the cost, I suppose?—The Metropolitan Board of Works will pay the cost of the subway, and the Railway Company will pay the cost of their works.

[The Witness withdrew.

[Adjourned to Monday next, at Twelve o'clock.

Lunæ, 9° *die Maii*, 1864.

MEMBERS PRESENT:

Sir Baldwin Leighton.	Viscount Grey De Wilton.
Mr. Floyer.	Mr. F. S. Powell.
Mr. C. George Du Pré.	

SIR BALDWIN LEIGHTON, IN THE CHAIR.

Mr. *Frederick Marrable*, sworn; Examined by Mr. *Wilkinson*.

430. I BELIEVE you are an Architect and Surveyor?—I am.

431. Were you formerly the superintending architect of the Metropolitan Board of Works?—Yes. *Mr. F. Marrable.* 9 May 1864.

432. Until what time?—Until March 1861.

433. When you were superintending architect were you employed, in conjunction with the engineer, Mr. Bazalgette. in designing some subways which are now under the consideration of the Committee?—Yes; the subway in Covent Garden-street.

434. That is the new street leading from Cranbourn-street to Covent Garden?—Yes.

435. Were you also concerned in the subway in Southwark-street?—No; but I have seen the drawings, I have seen the works, and the construction is very similar to that in Covent Garden; it is on the same principle entirely.

436. But you actually assisted in the preparation of the Covent Garden subway?—Yes.

437. And you have seen the designs for the Southwark-street subway, which you know to be of a similar character?—Yes.

438. Your attention has been called to the Bill now under the consideration of the Committee, for compelling the use of the subways?—Yes.

439. You have considered the provisions of that Bill, I presume, carefully?—Yes.

440. You have seen the petitions which have been presented in opposition to that Bill?—Yes.

441. Have you considered the statements in those petitions?—I have.

442. Allow me to direct your attention to a few of the leading objections to the Bill. One objection urged is, that the companies, both gas and water, will incur very great expense in altering their existing mains so as to allow of their

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being placed in the subway; will you state to the Committee your opinion upon that objection?—In altering the existing mains so as to be placed in a subway in old streets there would, undoubtedly, be an expense. With regard to new streets, I believe that the cost of laying the mains in subways would be much less than laying them in the usual manner in trenches.

443. Supposing no mains at all to be laid down, the cost of laying them in a subway would be very much less than the cost of laying them, as they are at present laid, in trenches in the street?—I believe so; I am not speaking of the existing mains of course.

444. But you are speaking of mains which would have to be laid in the subway?—Yes.

445. You are contrasting the expense of laying a main *de novo* in a subway with the expense of laying a main under the existing system?—Yes.

446. Are you aware of the length of the subway now in existence at Covent Garden?—About 450 feet.

447. What is the length of the subway in Southwark-street?—It is about two-thirds of a mile; somewhere about 3,400 feet.

448. Are you aware that it is proposed to construct a subway under the Thames Embankment?—So I am informed.

449. And also under the new street which is to be continued from Blackfriars to the Mansion House?—Yes.

450. *Chairman*] Have you formed any estimate of the expense of laying the mains?—I have not formed any estimate of the expense of laying the mains in the old way, nor of laying the mains in the new way.

451. Then, it is merely a matter of opinion?—Yes; it is not my business; I am not a pipe-layer; I cannot form an estimate on those subjects.

452. Mr. *Wilkinson.*] From what you know of the construction of those subways, you are aware, are you not, that their construction must be of a very gradual character, and, consequently, the distance of the subways must be very slight from time to time?—The construction of subways must necessarily be of a very gradual character. They are expensive, and can only be employed in new streets. As far as I can see, the cost of laying them in old streets, and the inconvenience would be so great, that I think many years must elapse before it is attempted.

453. And so far as the objection which is urged on the ground of large and immediate expense does that consideration, in your judgment, obviate the force of that objection?—Yes.

454. Now, allow me to direct your attention to another objection. They allege in their petitions that the opening of the streets to remove the pipes into the subways would be of the greatest annoyance to the public. Does the answer you have already given as to the comparative length of the subways, as compared with the existing length of the mains, render that objection, in your judgment, of trifling importance?—I do not think it is valid at all. There can be no expense, or comparatively no expense or inconvenience in carrying a pipe into a subway already constructed.

455. This is not as to the question of expense, but the allegation is as to the inconvenience and annoyance it must be to the public?—The inconvenience must be almost *nil*; I cannot conceive any inconvenience to the public in carrying a pipe into subways already constructed.

456. Now, let me direct your attention to the third ground of objection. It is alleged that the pipes and the mains which are made use of in the subway must, necessarily, be of a complicated and costly character?—The pipes that I have seen in the subway, in Covent Garden, are of the most simple construction. I have examined those in the subway in Nottingham, and they are of the most simple construction, likewise requiring, as far as I can see, no novel casting; that is to say, no new patterns or moulds. They are the ordinary gas pipes with the bends and elbows in common use.

457. In your judgment, is there any ground for that objection?—None, whatever.

458. Now, let me take you to a fourth objection which is stated in the petition, that the pipes would corrode much more quickly in the subway than they do now in the mode in which they are laid?—I should think that it would be directly the opposite. The pipes in the subway will be very easy of access and inspection, and occasional painting, should such process be necessary, can be very easily applied, without any annoyance or trouble to any one. The pipes can be either

painted

painted or coated with coal tar. The pipes in Covent Garden-street are buried a few inches in the gravel, but I think that is unnecessary. At any rate, with that they can be very easily got at, and with very little trouble can be painted, inspected and kept in repair. With regard to the pipes laid in the ordinary manner, we see when the road is broken up, and the pipe is relaid or removed, that it is corroded to an enormous extent. I have examined the pipes in the subway in Covent Garden, and the gravel itself being very dry, beyond the ordinary rust, such as must attack any iron in almost any position, there is no appearance of corrosion or decay.

459. *Chairman.*] How long have those pipes been down?—Rather more than three years; the street was opened about Christmas. It is three years and a quarter.

460. Mr. *Wilkinson.*] An objection urged is, that the pipes will be more subject to vibration than they at present are?—I apprehend quite the contrary. When I was standing in the subway, with the traffic in the middle of the day going on, there was scarcely any vibration on the ground on which I stood, which is the same ground in which the pipes are laid.

461. The pipes are not carried under the arch of the work?—No, they are laid under what we must call the flooring of the subway. Of course it is not flooring, but a layer of gravel. They are carried under that some few inches, that is, under the ground on which you walk in the subway.

462. Allow me to direct your attention to an objection peculiarly within your own experience. It is stated that the construction of subways will prevent the adaptation of those streets in which the subways are placed to other purposes afterwards. Is there any ground for such an objection as that?—If the subways are not large enough for a railway; that is, if it is intended to carry a subterteranean railway through that street, of course the subway will impede it. That is to say, the subway will require to be constructed of a different form and a different size.

463. But with the exception of subterranean railways, do you anticipate any difficulty in adapting them to any other purposes?—The same observation would apply probably to other companies; for instance, the Pneumatic Despatch Company, because their tubes are very large. They were not contemplated at the time this subway was made.

464. But supposing the space to allow it, would there be any difficulty in providing for the pipes of the Pneumatic Despatch Company, and the ordinary gas and water pipes?—I can conceive none. On the contrary it will be very much easier to lay down pipes, similar to those which they are now laying down in Holborn, and to joint them. They could be laid as easily as they could be laid in this room, one against the other.

465. The ordinary level of a subterranean railway is not the same as that which is taken for Southwark-street?—No, it must be very much more. They require of course a very much larger arch to carry the trains, and they must be of course of much greater depth.

466. Do you happen to know the depth of the Metropolitan Railway, now?—It varies in depth very considerably.

467. Do you know the depth at all?—I do not.

468. Would there be any difficulty in laying cross pipes?—I can conceive none.

469. Suppose the subways to intersect at right angles other streets in which no subways existed, do you anticipate any difficulty from that circumstance?—No, the pipes crossing might either be carried over the arch, if there is a sufficient depth; or, if there is not sufficient depth, they might be carried through the crown of the arch.

470. Or through the subway?—Yes, or through the subway; the only effect of that would be a certain amount of obstruction in the subway, but even that, in my opinion, would not militate at all against its utility.

471. Another objection taken, is to the supposed leakage of the gas mains; do you think any danger is to be apprehended from that circumstance?—I do not. If the gas pipes are first of all properly tested before they are used, then if they are properly laid carefully in the ground, and if only ordinary care and attention are paid to them to see that they do not get into a state of bad repair, I do not think there is any chance of leakage. If there is, it is very easy to detect it, and for this reason, if there is a leak in a pipe, there is of course a tremendous stench

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arising from it, and that can be followed out very easily to the point of leakage. If buried in the ground, the leaking gas is diffused very much, and it is a long time before the actual point of escape can be discoverd.

472. I need hardly ask you whether the danger of leakage resulting from bad construction, is not rendered very much greater by the circumstances under which the pipes are now laid in hurried thoroughfares, and without sufficient inspection?—Certainly. With regard to the subway in Covent Garden, there is no appearance of the slightest escape of gas, excepting in one small place. In one place where a $\frac{3}{4}$-inch pipe had been tapped, or rather had been put into the main, at the joint we found a slight smell of gas. The joint appeared to have been most improperly and imperfectly made. As far as we could ascertain, it was a mere hole punched out. We could not see any thread at the end of the pipe that was inserted; it was merely stopped up with a little clay run round with the finger.

473. In what subway was that?—In Covent Garden.

474. Was that from the main or the service pipe?—It was at the junction of a service pipe for one of the street lamps with the main.

475. That, I understand you, was the result entirely of bad workmanship?—Yes, that is my opinion. I could not discover any thread on the end of the pipe to indicate that it had been screwed in; it seemed only to have been pushed into the hole and stopped up with clay.

476. You, I think, have examined the Covent Garden subway carefully yourself?—Yes.

477. How are the pipes laid there?—They are laid a few inches in the gravel.

478. Do you approve of that mode of dealing with the pipes?—No.

479. What would, in your judgment, be a better mode?—I think a better mode would be to carry them upon chairs, something like railway chairs, and if a chair is placed at every joint, the whole would be perfectly steady and quiet.

480. Of course, that mode would allow of a complete inspection of the pipe?—Yes; if the chair be made high enough to raise it off the ground some eight or nine inches, then the workman can examine the joint all round, and he can examine the pipe all round, and so detect the smallest leakage that can occur, and repair it without trouble.

481. Would there, in your judgment, be any danger of a pipe dealt with in that way being liable to vibration, or to disturbance, from the pressure of loads going over the surface of the pavement?—None whatever; whatever weight might be passing.

482. Have you directed your attention at all to the ventilation of these subways?—Yes; they seemed to me to be very well ventilated; there was not the slightest disagreeable effluvium of any sort; the air was perfectly fresh and wholesome. I remained in that subway, I think, nearly an hour, without feeling the slightest inconvenience of any sort whatever; and yet at the time I was in there it was a muggy day, and there was no movement in the atmosphere above; therefore, there really was very little movement in the air below.

483. Have you directed your attention to the position in which the side galleries are in the Covent Garden subway?—Yes; I know all about that.

484. Just explain to the Committee whether or not the walls of the lateral galleries were in such a state as to admit of the same ventilation which they would if the street had been completed?—No; I think that in future subways a considerable improvement may be made in those lateral galleries.

485. The *Chairman.*] What are the lateral galleries?—At intervals there are lateral passages from the subway, as shown in that diagram, coming up to the back of the vaults. Those galleries are intended for the passage of the pipes supplied to the houses, there being a lateral gallery to each alternate house.

486. Mr. *Wilkinson.* As the subway is at present situated in Covent Garden, those are actually stopped?—Yes; but it was not intended that they should be stopped, because a small open passage was intended to be, and I believe was, left through the wall for the admission of the pipe, so that a pipe might be passed through without disturbing the ground. They were purposely left open for the admission of a current of air; but when the pipes have been laid through those, I believe they have got stopped up either with the soil which has been unnecessarily thrown in, or in carrying the pipe through into the houses, they have stopped them up very unnecessarily.

487. I believe only temporarily?—No, I do not think it has been done temporarily, because it has been done under supervision.

488. Supposing those passages to be constructed under proper supervision, will they not greatly assist the ventilation of the subways?—Undoubtedly. I should recommend in future subways, instead of making those lateral galleries abut on the backs of the vaults of the houses, that they should be carried right through into the open area attached to the houses, and thus have openings of some considerable size, say a foot square, defended with iron gratings, so that there may be also a thorough current of air from the open area between the houses and the vaults.

489. Would that be an improvement, with regard to future subways, over the existing subway, as it is now?—Yes; there would be no difficulty in doing that; there would be some little trouble in doing it, and some little cost; but there would be no engineering practical difficulty in it whatever.

490. You are the architect of the Garrick Club, I believe?—Yes.

491. That club is, I believe, entirely erected, is it not?—It is not quite complete.

492. The external part of the structure is, is it not?—It is all but ready for occupation, and in the course of three or four weeks it will be occupied.

493. I presume you have superintended the gas arrangements there?—The gas is not laid into the house yet; the junction is not yet made with the main.

494. You have, I presume, made the necessary arrangements for carrying out that junction?—The arrangements, as far as the house is concerned, are all complete. We have not yet got the meter; but the service pipe is laid in readiness.

495. Do you apprehend any danger or difficulty arising from the carelessness of servants, or any other cause, in consequence of the connexion with the main being in the subway instead of, as under ordinary circumstances, if there were no subway, it would be with the main in the street?—No; I cannot conceive that any danger will arise to the house in the least.

496. Have you personally examined the Southwark-street subway?—I have, on two occasions.

497. That subway contains gas pipes, does it not?—It contains two gas pipes, but they are not mains; they are only two-inch pipes laid on each side of the street for the purpose of supplying the street lamps.

498. Did you examine those pipes, such as they are?—Yes; they are laid above ground, open to the view.

499. Was there any perceptible leakage or smell?—No; not the slightest. I may observe that, when I was down there, the place was illuminated with, I believe, 700 candles, which was a very pretty sight. With all that flame, if there had been sufficient gas to cause an explosion, we should have been blown up.

500. What do you say with regard to the ventilation there?—The ventilation is very good; it is fair. The ventilation is carried on by means of ascending shafts with gratings in the pavement and the centre of the roadway. We tried holding candles, and torches of lighted paper to those openings, and we found there was a very considerable draught. As I said before, it was a most unfavourable day for testing the ventilation, because the air above was very nearly stagnant.

501. It was a muggy day without much current of air?—Yes; it was raining very heavily, and there was very little movement in the atmosphere.

502. Have you any other experience of actual subways which you can bring under the notice of the Committee?—Yes; I went down to Nottingham.

503. I will not ask you as to the details of the Nottingham subway, because we shall call the engineer from Nottingham who will give us those details, but, generally, can you tell me the character of the subway, and the result of your observation?—I believe that the general character of the subways of Nottingham is identical with these. Mr. Tarbotton, the engineer of the corporation of Nottingham, informed me that he had copies of the same drawings from which those were constructed, and he adapted them to his own purposes with very little deviation or variation.

504. Was your attention called to the pipes in the subway of Nottingham?—Yes; they all lay above the ground, or were exposed to view.

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505. Had they been there a long time?—About a year, I believe; I was informed so.

506. Could you, in any way, test the opinion of the people of Nottingham on the subject?—The mayor and several members of the corporation went down with us, and they all expressed their entire satisfaction with the success of the plan, and they expressed a determination, I think I may call it, to carry it out wherever practicable in the town of Nottingham.

507. Then, am I to understand you, that their satisfaction was not the result of that particular visit which they paid in company with you, but of the experience which they had acquired during the time that these pipes were in the subway?—It was the result of their experience; they did not express anything else but satisfaction.

508. Those subways are down two particular streets, are they not?—Yes; it is one street really.

509. The streets run nearly at right angles to one another, so that the subway is in the shape of the letter L, but it is continuous; therefore, so far as your experience of the Nottingham subway is concerned, does that rather give you a favourable idea of the proposed subways in London?—Yes.

510. You have already told me that one great advantage consists in the more careful laying of the pipes originally, than if they were laid in a hurried thoroughfare; has your attention been directed to the necessity of employing artificial light in the subways in order to lay the pipes?—Artificial light, I have no doubt, would be necessary in laying the pipes, but then when the pipes are laid there is no gas in them. They are laid, of course, before there is any gas in them, and therefore any amount of artificial light can be employed with perfect safety.

511. Then, so far as the pipe-laying is concerned, artificial light may be employed with safety?—Certainly; there is no gas till the pipes are laid.

512. Supposing reparation were required, then artificial light would be required?—Yes; they make the reparations at Nottingham, having a permanent plug at one end of the main, near to one of the ventilating shafts by which they have a certain quantity of light; that plug is very easily removed, and a bladder is inserted, and being inflated the gas is shut off entirely.

513. Does that precaution render the reparation of the mains by artificial light safe?—Certainly, as far as I can see it obviates all possibility of danger.

514. Is the safety lamp used?—No; we walked about with open candles.

515. There was no occasion for the safety lamp?—Not the slightest; there was no smell whatever.

516. I presume, in your capacity of architect, your attention has been called to the great inconvenience sustained by the public in consequence of the tearing up of the streets?

The *Chairman* stated that the Committee were of opinion that the Witness need not be examined upon that subject.

Cross-examined by Mr. *Richards.*

517. You began by stating that the cost of laying the pipes in the subway would be less than the cost of laying pipes under the old system; do you know anything whatever about either?—I only speak from common sense.

518. Never mind common sense?—But I do mind it very much.

519. Then we will take your common sense, and see what it is; what is the cost of laying an 18-inch main 100 yards?—I have already stated I do not know; I am not a pipe-layer.

520. You do not know the expense of that either by one plan or the other?—I have already said so.

521. You stated that there would be no expense or inconvenience in carrying pipes into subways already constructed?—When I say no expense, of course I mean small expense; you cannot do anything without paying for it.

522. I understood you to mean no serious expense?—No.

523. You propose to take up the existing pipes which now lie in the soil?—No.

524. Do

524. Do you propose to leave the gas pipes now lying in the soil?—My answers were directed entirely to laying the pipes in subways constructed in new streets, where there are no existing pipes.

525. You did not so limit it as I understood you?—I think I did.

526. You intend to limit it to subways constructed in new streets?—My remarks applied not to anything in existing streets.

527. Are you aware that if they do make subways in existing streets it is proposed to make it compulsory upon the gas and water companies to remove their pipes into those subways when constructed?—There is some such clause, I believe.

528. That is rather a material clause, is it not?—I suppose it is.

529. Have you any notion of what is the number of miles of mains that are laid down in London?—No; from 200 to 300, I dare say, or more.

530. Two hundred or 300 miles do you mean?—I should think so; a great many more, perhaps.

531. If you were to multiply that number by seven you would be nearer the mark?—Very likely.

532. With regard to the expense of taking up those mains, and putting them down in the subways, you know nothing?—No.

533. You say that the pipes would require no particular casting; are you prepared to say that at the point where the pipes come out of the subway, to join pipes which are not in the subway, there would be no necessity for a peculiar casting?—Yes, I am prepared to say so.

534. What is your experience?—Govent Garden is a street in which there is a subway in which pipes come out to join pipes where there is no subway.

535. The size of a main in Covent Garden is a 6-inch main, is it not?—Yes.

536. Do you know what the size of the old gas mains in London are?—They vary.

537. Do you know that there are gas mains as large as 36 inches in diameter, others of 24 inches in diameter, and others of 18 inches in diameter?—Yes.

538. And of the latter a vast number?—I believe there are some as large as 36 inches; I will not speak with certainty.

539. What is the length of the Covent Garden subway?—450 feet.

540. Do you think that a 6-inch main taken along a subway of 450 feet, is a fair test of the system to be applied, in which it is proposed to apply it to large gas mains?—I do.

541. Do you propose to put these large gas mains on the standards which you spoke of, or are they to be put on the ground?—I call them chairs; I am not a practical pipe-layer, but I am bringing in common sense again. I say that the best way to lay those pipes would be to let them rest on chairs similar to railway chairs, and by that means, if the pipe is raised by those chairs about 8 or 10 inches from the surface of the ground of the subway, that then inspection all round is perfectly easy.

542. We take such different views of common sense; I suppose that not being a practical pipe-layer you do not know, in fact, much about it. Does it not come to that?—I have said I am not a practical pipe-layer.

543. With regard to the case of Nottingham; what is the length of the subway at Nottingham?—Just about the same as Covent Garden.

544. And the size of the pipe?—I believe the same.

545. You have told us that there is no danger in laying the pipes, because at the time the pipes are laid there is no gas in them; are you aware that if this system is carried out, that the pipes of one company will have to be laid in a subway where, in all probability, the pipes of another company may be already in existence?—No, I am not aware of that; I am aware that a very few years ago the gas companies districted out the whole of the Metropolis, and if a district is in the hands of one company, they will take care not to allow another company to be there.

546. Do you believe, then, that the leading streets of London, at present, have only the pipes of one company in them?—I do.

547. Do you believe that that is the case in Regent-street?—I do not know much about underground in Regent-street.

548. If I were to tell you that there are the pipes of three companies in Regent-street would you doubt it?—I should. The old pipes may have been

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left in, but I should very much doubt the fact of all three of the companies having the right of service from those pipes. As I have said, I am not a pipe-layer.

549. *Chairman.*] You only come to give evidence of what you do know?—That is all.

550. Mr. *Richards.*] Have you any practical knowledge with regard to leakage?—With regard to leakage, I have some practical knowledge; there is no leakage except the very slight one which I have mentioned in Covent Garden.

551. Was that a leakage to which gas pipes will always be liable?—No, they ought not to be.

552. Can you easily detect it, if it arise from bad work?—That was so in the subway which I referred to.

553. But with reference to the immense number of pipes which do exist in London, wherever there is a faulty connection, an escape of gas will take place?—Of course; if there is a faulty connection an escape of gas will take place.

554. Does it not very often happen that faulty connections do exist?—I dare say it does; but I am quite sure of this, that in these subways a faulty connection need not exist.

555. That is formed upon your experince of Nottingham and Covent Garden?—No; common sense again; if the thing is properly done, and is open to subsequent inspection.

556. With regard to the Southwark subway, the service pipe is a two-inch pipe?—There are two two-inch pipes for the supply of the street lamps.

557. Are you aware that in Covent Garden you could not get a two-inch pipe into the subway?—I am not aware of that; I think I could.

558. Do you know anything about it?—At the time the drawings were made for that subway, the side entrances, by which the Commitee will go down to-morrow, were designed with a view of getting in a 12-inch pipe, or even larger pipes.

559. Of the ordinary length of 12 feet?—I think that is rather more than a 12-inch pipe; I never saw a 12-inch gas main 12 feet long, I do not recollect it.

Cross-examined by Mr. *Toulmin Smith.*

560. You say you have paid great attention to the Bill now before the Committee?—I did not say great attention.

561. You say you have read it through carefully?—Yes.

562. You are aware, as a matter of fact, that this Bill proposes to control future legislation, are you not?—I think there is some such clause as that.

563. If you have read the Bill carefully, are you not aware that both in the preamble, and in the third and fourth clauses, the proposition is, that not only as to the subways which have now been made, but as to those which shall be made in future, under the powers granted by Parliament, that this is to override and control future legislation?—There is a clause of that sort; I am not sufficiently lawyer enough to know what bearing it will have.

564. You admit there is a clause of that sort?—Yes.

565. Are you aware that in the year 1860 you recommended to the Metropolitan Board of Works that the payment, which is now proposed by this Bill to be charged upon gas and water companies, should be charged upon the houses on each side of the subway?—I do not recollect. You are referring, I see, to a report of my own.

566. I hold in my hand a copy of your own report?—Whatever is in that report I recommended.

567. I ask you, if you have a copy of your report in your hand, whether I am reading it correctly. In page 5 are the following words in my copy: "it appears that the extra cost of constructing the subway, as now proposed, will not exceed 2*l.* 0*s.* 11*d.* per foot run, or about 1*l.* per foot frontage on each house; which, together with the cost of the vaults, sewers, and road, might either be charged at once on those taking up the ground rents." Is not that quite correctly stated?—You have quite correctly stated what is in that report; but you have not stated the meaning of it.

568. Having read the original to you, perhaps you will state the meaning?—My principle of common sense tells me that the charge which is proposed in this

this report for the original construction of the subway, together with the cost of the vaults, and sewer, and road, might be charged as a charge on the freeholds; or, rather, as a charge to the leaseholders, or to those taking plots of ground for building purposes, just the same as under ordinary circumstances, when the freeholder, in laying out his property, makes a road, and makes a sewer in that road, he apportions the cost of the making of the road and the sewer between the frontages.

569. Have you not heard my friend, Mr. Phinn, in opening this case, state that the desire of the Board is to be recouped the cost of construction in the shape of interest, at the expense of the water and gas companies?—No.

570. Mr. Bazalgette having stated that, as the engineer of the Metropolitan Board of Works, do you agree with Mr. Bazalgette that the interest of the outlay should not be charged on the gas and water companies?—I do not think I can give any opinion on that.

571. You do not agree with what you wrote in March 1860, in which you did express that meaning?—No, I did not.

572. You stated that the interest should be a charge upon the ground-rent or freehold for the cost of construction?—Yes.

573. If they pay the cost of construction, can it be consistent with the principles of common justice that the gas and water companies should be charged over again for the cost of construction in the shape of interest?—No; but the houses have not been charged with the cost of the subway. I agree with this; that in this report, I merely stated that the cost of the subway, together with the cost of the vaults, the sewer and the road might either be charged at once upon those taking up the ground-rents, or be added as an annual charge in addition to the ground-rent, that is, throwing the burden of the construction of those subways upon the persons who built on either side of the street, and it would be charged, I say, either as a whole, a lump sum at once, or as a ground-rent, just in the same manner as the cost of the construction of vaults has been charged on the parties taking the plots of ground.

574. It has already been charged, has it not?—The vaults, and the construction of the roadway, and subway, and side galleries, were all done in one contract, and after that the cost of making the vaults to each house has been taken out, and the cost of those vaults is charged at once upon anyone applying for a lease; when anybody applies, he enters into an agreement that he will pay the cost of those vaults.

575. *Chairman.*] He pays so much less for the lease?—He pays nothing in the way of premium except the cost of those vaults.

576. Mr. *Powell.*] What houses are you referring to?—In the Covent Garden-street.

577. Mr. *Toulmin Smith.*] You say, in ordering that to be done, you have taken out the cost of the vaults; what is the amount that has been so taken out; in other words, what has been the cost of the sewers?—

Mr. *Phinn.*] If you turn over the next page you will find it given.

(*The Witness.*) That is only an estimate; the actual cost has been ascertained for that; it depends upon the length of frontage. I think on the average each vault costs about 12*l.* 10*s.*

578. Mr. *Toulmin Smith.*] What is the length of each vault on the average?—Three vaults make 22 feet 6 inches, so that you can divide that; about 37*l.* is the sum charged to each house of the ordinary frontage of 22 feet 6 inches. Most of those streets were laid out for frontages of 22 feet 6 inches; there is some variation, but that is the general dimension and cost of the vaults.

579. In that charge do you include the cost of the sewer, because I believe in those leases that is also charged?—No, it is not.

580. Are those made exclusively at the expense of the ratepayers?—I had nothing to do with the sewer. I know very little of the details of that sewer; it was not in my department when I was at the Board of Works.

581. Then, it being as you have stated with regard to these vaults, and as regards your opinion, as expressed in your report, as to what charge should be made upon the leaseholders, does it not follow that no other charge can be imposed upon any one except the charge of maintenance?—No charge can be imposed upon the leaseholders. I believe, as yet, very few leases have been granted; they are under agreements for leases, and have paid for the vaults;

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beyond paying the ground-rent, which they covenanted to do, have not been charged anything.

582. You say that they have been charged their proportion of the cost of the subway?—I have never said so.

583. What is the meaning of this report?—That is a report which was made before the thing was ordered; it was made in 1860, and it is upon that report, as we have already been informed, that this subway was made.

584. In that report you have expressed an opinion that the first cost of this subway ought to be charged as a part of the charge to be made upon the leaseholders?—I do not think I said "ought," but that it "might"; "might" and "ought" are two different words.

585. At any rate, you said it might either be charged upon those taking the ground, or be added to the annual charge of the ground-rent?—It is a mere suggestion that the cost of the work should be charged in sections on the leaseholders, or that it might be charged in part, or left altogether as it is. The subway, the sewer, and the making of the road has all been paid for by the Metropolitan Board of Works out of the funds at their disposal, but the cost of the vaults has been laid upon the persons taking leases of the plots of ground.

586. You then suggested that the cost of the subways should be charged on those who took the ground in one way or other?—It was necessary to fix those alternatives.

587. You thought then it was unfair to charge the companies with the cost of subways which they did not want?—There is not one word about the companies here, in this report.

588. There not being a word about the companies in your Report of 1860, what is the reason why they are introduced now?—I am not in the confidence of the Board of Works to that extent.

589. Can you conceive that there is any fairness in charging these companies with these works which they do not want?—I really must decline to answer that question; I am not in a position to answer it; I am not in the counsels of the Board.

590. Although you are not in the counsels of the Board, yet, as you were employed with reference to this Covent Garden subway, perhaps you can tell me how it occurred that neither the large mains of the gas or water companies can be got inside?—It occurred to me to such an extent, that a contrivance was made by which the pipes were carried in.

591. Mr. Bazalgette distinctly stated to this Committee on Friday, that any such contrivance did not exist up to this time?—I do not think Mr. Bazalgette could have said so; I heard his evidence.

592. What is the size of the pipes which are there now?—Six inches.

593. I put to him questions respecting pipes of 30 inches, and 12 feet long, and he stated that there was no arrangement made for that purpose?—No, because it is unnecessary; there is no arrangement made in that street for getting in a pipe 36 inches in diameter, because it is utterly impossible that such a pipe can be required.

594. Why is it not required?—Because it is not the main thoroughfare; it is not like the Strand or Regent-street; it is, in fact, only a second-class street, and is so denominated.

595. Will you explain to me how it is that, even although it is a second-class street, it may never be necessary for companies who carry their supply a great distance, to traverse even that small street with their largest pipes?—Because I think they would choose another course, that is all. It was not thought necessary at the time; but that does not militate against the objects of the Bill. If it is practicable to make a side entrance which will admit a 12-inch pipe, it is equally practicable to make an entrance that will admit a 36-inch pipe.

596. You have not considered how it is to be done?—It was considered at the time it was made, that it was not necessary to make a sideway for the admission of a pipe of those dimensions. But if it had been necessary it would have been just as easy to make a side entrance capable of admitting a 36-inch pipe as a 12-inch pipe.

597. It will be necessary to make such side entrances in the case of a new street passing through the City, will it not?—I should recommend that a side entrance

entrance be made for the admission of the largest pipe that is made; and there would be no difficulty in that at all.

598. You differ from Mr. Bazalgette; because, in the case of the new street, he proposed that arrangements should be made for admitting the pipes of the Pneumatic Despatch Company in the subway, which are as large as 35 feet:—I do not recollect Mr. Bazalgette saying so, but he might have said so; and I believe there would be no practical difficulty in it; and I repeat, that if those are the requirements of the public, there would be no practical difficulty in making a subway capable of containing all those conveniences.

599. Then, as to the evils which have been spoken of so much about by Mr. Bazalgette and others, and of which you have spoken so much, you say the principal evil existing to the thoroughfares is the haste in laying gas pipes, which causes a leakage?—I did not say that was the principal difficulty.

600. You certainly said the principal evil was caused through hastily laying gas pipes?—That is as far as the gas pipes are concerned. I think the principal difficulty and principal inconvenience arises from the necessity of continually breaking up the roads, and so obstructing the thoroughfares, and putting the inhabitants on either side of the street to great inconvenience and great loss, so far as their trade is concerned. I think the inconvenience to the public was the great objection to the present mode, and it was that great objection which, in fact, induced the adoption of subways.

601. You have explained to us that there was a leakage that occurred in the Covent Garden subway, and which you ascribed to some carelessness?—Great carelessness, or rather altogether to the want of anything like care or proper attention.

602. Will you explain to us if already, in the case of the Covent Garden subway, there was a leakage from a small 6-inch pipe, which, as you say, might arise from carelessness, why we are never to expect carelessness in the case of a pipe of 36 inches?—There must be proper supervision and proper care taken that the workmen do their duty. There ought to be an inspector to see that the pipes are laid properly. It should be his duty to see that every pipe is laid properly. In consequence of the position of that pipe the most unexperienced person in the question of gas pipes will be able to detect a leakage.

603. With regard to workmen, we do not always expect a large amount of common sense from them?—But an inspector should be appointed over them.

604. But inspectors sometimes do not exercise proper care?—Then it behoves the companies to employ inspectors that will. It is obvious that the more easy the detection, the greater advantage it will be to the company. If the error is easily detected it can be easily remedied.

605. You stated, with regard to the Covent Garden subway, that the ventilation was perfect?—It was very good; I said it might be improved, so that I could hardly have said it was perfect.

606. In the case of Southwark, you said it was only fair, and that it wants great improvement?—No; it was the same thing as the Covent Garden.

607. Can you tell me what is the size of the gas and water pipes laid into the subway of Nottingham?—I believe it is six inches.

608. Can you inform me whether the Nottingham Corporation have compulsory powers by which they compel the gas and water companies to go into these works?—I do not think they have, but I have been informed that the companies put their pipes in these subways without making the slightest objection; and, as far as I know, they do not object now.

609. Do they charge the companies for liberty to go in?—I do not know; I am not in the confidence of the Corporation of Nottingham.

Cross-examined by Mr. *Bruce.*

610. With regard to Covent Garden, there are two sets of mains, those of the Equitable Gas Company and those of the New River Company?—Yes.

611. You have read through the petitions against the Bill, have you not?—Yes.

612. You are aware that both those Companies oppose this Bill?—Yes.

613. Therefore, we may assume that they are not quite satisfied, although their pipes go along the Covent Garden subway?—I am not in the confidence of those Companies; all I know is that they have petitioned against the Bill.

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614. You spoke of the ventilation of the Southwark subway; at present there are no houses on either side of the subway?—Yes; I think the subway extends as far as the houses that are already built, but certainly as far as one or two.

615. There are very few comparatively along it?—No, very few.

616. Therefore, all the sideways, at present, are exposed to the open air instead of the houses?—What sideways?

617. Are there not sideways in the Southwark subway as well as the Covent Garden side galleries?—Yes.

618. At present, these are all exposed to the open air?—To the best of my knowledge, not one of them.

619. What is at the end of the side gallery?—A brick wall.

620. Are they quite covered up?—Yes.

621. Are you sure of that?—I believe so; I am as nearly sure of it as possible. These side entrances are stopped. If they were not so, all the little vagabonds of the neighbourhood would get down. I have good reason for believing that since my inspection an opening has been made in one or more of them, and gratings have been inserted to try the effect of an improved ventilation; but, to the best of my knowledge and belief, all those side entrances were entirely stopped when I was in the place.

Re-examined by Mr. *Phinn.*

622. We have not much experience of subways yet; do you suppose that perfection can be arrived at when the first subway is constructed?—No.

623. With regard to the escape of gas in the Covent Garden subway, is it true that the service pipe was bedded up in the ordinary way, that is, covered with gravel?—Yes.

624. You do not advocate that?—No, certainly not.

625. If that service pipe had been laid in the way you advocate, the escape of gas would be detected at once?—Yes.

626. Therefore, you rather pray in aid this escape of gas in Covent Garden as supporting your theory?—Yes.

627. With regard to a large pipe, will there be any difficulty in making an incline into the subway for the purpose of taking down the largest pipe?—None whatever.

628. You would have one hole for the hen and another for the chicken, I dare say?—Yes.

629. Viscount *Grey de Wilton.*] With respect to these gratings, have you experienced any inconvenience on a very wet day from the mud finding its way into the subway?—No; a very slight inconvenience indeed; in fact you may call it nothing. Of course the flooring of the subway is not like the flooring of a drawing-room. It was raining hard, and there was scarcely any wet there.

630. You think the mud is not likely to clog inconveniently?—Certainly not.

631. *Chairman.*] Is the water laid in the Covent Garden subway, or only the gas?—Water and gas both; the New River Company have their mains there, and the Equitable Gas Company also.

632. You are not aware of the slightest inconvenience arising from the gas and water pipes being together?—Not at all. They lie one by the side of the other; but I cannot conceive the slightest inconvenience.

633. Mr. *Powell.*] Do you apprehend that there will be any accumulation of gas from the manner in which they will construct the subway?—None whatever.

William Tite, Esq., a Member of the House, sworn; Examined by Mr. *Phinn.*

William Tite, Esq. M. P.

634. WE know you are the Member for Bath?—Yes.

635. You have had a long professional experience, both as an architect and as a surveyor, I believe?—I was architect for about 40 years, and I very recently retired.

636. Your knowledge is especially with reference to the Metropolis?—Very great

great indeed. I was born in the Metropolis, and I practised in it. At the same time I have had a very large practice in France, perhaps larger than any other English architect.

637. You are also a member of the Metropolitan Board of Works?—I am. I represent the parish of Chelsea. The Metropolitan Board consists of 40 members, returned by the parishes into which the Metropolitan district is divided. I have represented, for the last two years, the great parish of Chelsea, which contains about 300,000 people.

638. Do you know of the complaints which have been made of the great obstructions of traffic?—Yes; I feel it daily myself.

639. In consequence of the obstruction of traffic, has your attention been directed to the means of relieving it?—I want to separate a good many questions which have all been mixed up together. The point that we are aiming at by the subways at the present moment arises in this way. One of the functions of the Metropolitan Board of Works is to make improvements in the Metropolis by making new streets, and so on. We have made some new streets, and we are now going on with that great improvement, the Thames Embankment, and we are going to carry on a new street from there to the Exchange. It appears to us to be quite impossible, and inconsistent, and unreasonable, that those streets, elaborately paved, enormously used as they must be, should be torn up for the introduction of pipes, and therefore the Metropolitan Board of Works resolved to adopt the system of subways. The Board had previously resolved to try the experiment in the Southwark-street and Covent Garden-street. The plan having succeeded in Covent Garden-street, we resolved then to bring in this Bill. With regard to introducing them into old streets, it is not very likely we should do so. In the first place, we have no power whatever; and, in the second place, we could not interfere with the City of London; and, in the third place, it is not at all necessary to contemplate it for the outlying districts. We think that those who appear in opposition to us, much to our surprise, thoroughly misunderstand the point.

640. In point of fact, you have power to construct these subways in the new streets?—Yes.

641. But you propose to compel the companies to come into these subways in the new streets?—Yes; and I think they ought.

642. We will not go through the various reasons for it, but you have heard the reasons alleged by the previous witnesses?—Yes.

643. Is it of any use going on constructing the subway under the Embankment, and under the New-street in the City, unless you have the power of making the companies come in?—I should imagine that we should hesitate a good deal in making them unless we have power to compel their use; because, with regard to the water companies particularly, we think there is a great deal of prejudice. We think it only reasonable we should have the power of compelling the companies to come into these subways in the new streets. With regard to the size of the pipes, our engineer has been instructed to put himself in communication with the engineers of those companies which are to come through these subways; and if they are not made big enough, that is the fault of the engineers who have been employed. With regard to the mains, and so on, I conceive no difficulty. With regard to the pollution of the water, owing to the escape of gas amongst the water, I cannot conceive what it means. There cannot be any pollution when the pipes are supported on chairs. But when they are all crowded together in a crowded street, and the pavement is taken up, and the pipes are relaid in a hurried manner, I can conceive that to be very possible. But that cannot exist in a subway; those are the general views of the matter which we have.

644. What do you say with regard to gas?—With regard to gas, there is the obvious question of the possibility of an explosion occurring. Upon that point I should state that the Board consulted the very ablest man I know of as a gas engineer, who signed this report, George Lowe. He has been a Fellow of the Royal Society for 25 years. He is one of the ablest men I know; and he is gas engineer to one of our oldest companies in the City. It is idle to suppose that a man of that kind, who was chosen specially, would have agreed to recommend us to go to a large expense in making the subway if he believed it could not be made.

645. Is that the report I called attention to in my opening?—Yes. There

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are others who signed that report. First, there is Robert Stephenson, who was our great adviser; Thomas Hawksley, who is the great water engineer; and George Lowe, the great gas engineer; Thomas Henry Wyatt, who is an architect, not connected with us; William Cubitt, that is, the late Alderman Cubitt. I should also express my own judgment, that if the subways are made with great care, there will not be the slightest difficulty with regard to an inspection of the pipes. I cannot help thinking that there need be no occasion for any escape of gas. If an escape did arise, I believe it would make its way through the large ventilators which there would be in the subways. I went, on Friday last, through these subways, and the question arose as to whether these openings will not be subject to be filled up with mud. I found that very slight indeed; it was a very wet day, and there was nothing but a slight quantity of mud, which could be easily removed.

646. They are in the crown of the street which slopes to the gutter?—Yes.

647. So that it would be a point where a slope would commence towards the gutter?—Yes. Those are the general views, I think, of the Board. I speak, also, in addition, from my experience as a practical man.

648. Now we come to a very tender point about the payment; these companies have the privilege of laying down pipes for nothing, but we want to make them pay?—In a certain sense it is permissive; the Board is a Board constituted for managing everything that is for the benefit of the public; if the Board thought it an unreasonable thing to ask them to pay, they are not directed in any sense to compel it; but if they think it reasonable that they should be paid for, it appears to me a very simple matter. The interest per mile on the cost of this subway is 600*l.*, which would be divided between the two sides of the road. It does not seem to be a very important question either for us or for them, and I am surprised to see them raise this enormous opposition to it. If it was alleged that a gas company was in difficulties, or that there was anything unreasonable in our asking them to pay us, we should not ask them to pay us. We know we should save them a great deal of money if we did it. If they were to say, "We think it unreasonable we should be called upon to pay," then it goes to an umpire appointed by the Board of Trade, by whom all the circumstances would be inquired into, and they would either pay or not, according to the decision of the umpire.

649. First of all, they say it is unfair, and that they should not pay at all, or that if they are to pay, that some principle should be established by Parliament?—For my own part, I think it so right that I do not see any principle which I can apply to it. I think the principle which guides the Government in paying for the carrying of the mails throughout the country, which is the principle of arbitration, is not an unfair one for these subways. The Postmaster General is bound to pay for carrying the mails to Plymouth, as the arbitrator may determine.

650. Have you had any special experience of subways in Paris?—I know them very well; I was President of the Institution of Architects, and all these things were matters of perfect notoriety; they are not subways in Paris; they are large sewers. The principal thing with regard to the subways in Paris is, to keep them pure. The accident which occurred in the Rue de Carrousal arose from a pipe which went through the archway.

651. Are you not mistaken in saying that the accident occurred in the Rue de Carrousal; was it not in the Rue de St. Martin?—Yes; the French engineers are hesitating as to the introduction of gas pipes in their ordinary sewers along with their water pipes, and I think they are hesitating very properly; but I also think they have made a mistake in not having done as we have done with the subways; if the gas pipes cannot go into the subways, it will be a matter of regret to me, but if it cannot, why the water pipes should not be allowed to go in I cannot in the least understand.

652. A sewer constructed for the purpose of excluding air, would give very little light as to the possibility of explosion from gas pipes, a subway being constructed on totally different principles?—That is my impression.

Cross-examined by Mr. *Denison*.

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653. My learned friend assumed in several of his questions that you have power under your present Acts to make these subways; what are the Acts which you referred to?—I do not know that; I understood that to be assumed.

654. Then we are to take that as my learned friend's evidence, and not yours?—Yes; or you may take it from the solicitor.

655. You say, as I understand you, that you contemplate this chiefly for new streets, is that so?—Yes, for new streets.

656. Have you read the Bill?—Yes; again I say I am not a lawyer, I only take what it means.

657. But you are an architect, a man of experience, and a legislator, and this is a public Bill?—Legislators are not necessarily lawyers.

658. As you will have to deal with it in another capacity, and not as a witness, will you be kind enough to point out to me what clause in this Bill limits it to new streets?—It does not.

659. Is there any provision in your Metropolitan Board of Works' Act for authorising your Board to bring in Bills at the cost of the ratepayers?—Yes; this is, I believe, called a hybrid Bill. I am not sure what that means, although my name is on the back of the Bill with two of my friends, who are also members of the Metropolitan Board of Works, Mr. Miller and Mr. Doulton.

Mr. *Phinn* stated that the powers would be found in the 144th sect. of 18 & 19 Vict. c. 120, and 21 & 22 Vict. c. 104, s. 25.

660. Mr. *Denison*.] Did I understand you to say that you had applied to some of the water companies about this matter?—I presume that the engineer has.

661. I should like to have positive information rather than presumption?—He can tell you; I cannot. In the front of the Exchange there is a perfect labyrinth.

662. You do not know what the engineer has done?—No, but I may give this explanation, I presume.

663. No, because you tell me you cannot answer my question. What I now ask you is, and I think you probably will be able to answer me, upon what data you took this rent or estimate of 600 *l.* a year?—Upon the report of the engineer, and the report of the architect; Mr. Marrable said the cost would be 2 *l.* 0 *s.* 11 *d.*, and Mr. Bazalgette said he would do it at the outside of 3 *l.*

664. Mr. Marrable said that a frontage of 22½ feet would cost 37 *l.*?—That is the rental.

665. That is an element in the calculation?—I do not know why it should increase the cost. The engineer stated, on Friday, that it did cost in the construction 3 *l.*, at the outside, per foot lineal.

666. I am asking you a very harmless question; upon what estimate is your calculation founded?—None whatever, because I took it from the engineer. I could have estimated it. I mean my previous accidental position as an architect would enable me to judge whether he is right or wrong.

667. What do you give as your estimate, from your architectural experience?—That is no business of mine; I am master and not man. What I mean is, that Mr. Bazalgette is a man of very high eminence. He has made a report to the committee, of which I am deputy chairman, that it will cost 3 *l.* per foot forward; we asked him no further questions.

668. Now, as to this report of Mr. Lowe and others, did that advise you that these subways were things which could be efficiently carried out with reasonable cost, and so on?—No, it does not: but I think that was fairly to be inferred.

669. But we would rather have the thing itself, but here is what they did tell you?—Yes.

670. You say there is a reference to the Board of Trade, to determine how much the gas and water companies are to pay for this arrangement?—That is not so; it is for the Board of Trade to appoint an umpire under that Act of Parliament, which is an Act of Parliament with which you are very familiar.

671. What is the umpire to do?—He is to determine finally the whole question.

672. How much we are to pay?—How much you are to pay, if anything.

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673. Will you just refer me to the clause of the Act of which you think that is the construction?—This is it, I should think. "The Board may, if they think fit, demand and receive payment by way of annual rent, or otherwise, from any company, body or person, for the use, by them or him, of any subway." I suppose under that the Board can, if they think fit, call upon a water company or a gas company to pay something.

674. And that will be how much?—We should say how much we wanted. If they thought that was not reasonable, there would then be a deputation from the company to the Board, who would say, "We are not content; we think we ought not to pay anything under the circumstances." The Board would say, "We think you ought to pay so much." Then we should appoint an arbitrator, and they would appoint another; and in the event of those arbitrators differing, it would be tried, in the ordinary way, before an umpire appointed by the Board of Trade, and then counsel would appear.

675. Did I understand you to say that your intention, in bringing in this Bill, is to leave the arbitrator to say whether anything should be paid or not?—No; I do not. He would be perfectly competent to do what is necessary.

676. Is it your intention, in proposing this Bill, to leave to the arbitrator to say whether anything ought to be paid or not?—I think so.

677. You know the evidence which Mr. Bazalgette gave the other day?—Yes.

678. He said we ought only to pay for maintenance?—Then you would have nothing to pay, because the maintenance of a subway of that kind would amount, in my judgment, to little or nothing. That is a question which Mr. Bazalgette ought not to have answered.

679. Do you, or do you not, agree with Mr. Bazalgette, that maintenance is the only thing which we ought to pay for?—Certainly not. I say that the maintenance must be in the hands of those who ought to make the payment.

680. I am talking of the payment?—No; it would amount to nothing.

681. What is it you contend that we ought to pay for?—I contend that you ought to pay for the use of these subways, which, to you, would be a very great saving. I think it is quite reasonable that, inasmuch as you are to have the benefit, that you should have to pay for it.

682. Your contention is this, you give that 600*l.* per mile per year under the head of rent, that should be a rent of some 4 or 5 per cent. on the actual cost of the subway?—We borrow money at 4 per cent., on the average.

683. Is this 600*l.* calculated at 4 per cent. upon the actual cost?—Yes.

684. That is what you contend we ought to pay?—No.

685. What is it you contend we ought to pay?—I say if there is any doubt in your mind as to the sum which you ought to pay, that you must appoint an arbitrator; I say it has cost me 600*l.* a year to put that down. I propose to charge you half, or something, or nothing. It is for you to show *primâ facie* that you are not entitled to pay anything.

686. You taking that *primâ facie* view of it, and directing this Bill to be brought in, you put in Clause 9 that the Board may demand, if they think fit, payment by way of annual rent for the use of the subway?—Yes.

687. Then you tell me that your view is, that we should pay a rent in proportion to the cost?—I think we should start with that as a principle, and if we found it was not reasonable it would be abandoned. I do not know that we have charged anything in Covent Garden-street; I believe we have made no charge there.

688. You have not got any Act of Parliament yet?—I do not think we have asked for anything. You must please to recollect that we are the Metropolitan Board of Works, we are not a body of speculators, but a body of private gentlemen giving a great deal of our time and attention for the public benefit, and doing our best to carry it out; we have no personal object in it at all.

689. You want to carry out this thing?—We want to carry out this, and do justice to the ratepayers, who will have to find the money.

690. You assume that this 600*l.* a mile represents the cost, and that either the water companies or gas companies, or ratepayers will have to pay for it?—No doubt; that is, they pay for it in this shape, that it is as broad as it is long.

691. You assume that either the gas companies, or the water companies, or the ratepayers will pay for it?—Or both; it will be divided.

692. In one character or another, I presume, we may say that most of us are interested, either as consuming water or gas, or as paying rates?—It is so infinitesimal

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infinitesimal, that when you are talking of two and a half millions of money to be repaid in 30 years, it is not worth your appearing about.

693. Perhaps it is not worth Mr. Phinn's while to appear?—We are obliged to appear. I make that remark with great submission, but I was rather led into it. I am astonished at such a large bar opposing such a question.

694. I know that you large people think nothing of two and a half millions?—One million is to make the embankment, with the road on it, from this House to Blackfriars, but I think it will cost a great deal more.

695. How much do you think it will cost?—I cannot tell you.

696. That is for the embankment alone?—It will be one of the finest works in the world, which you will be delighted, as an Englishman, to see. We take up at Blackfriar's Bridge the embankment which goes no further. We are to continue the street 70 feet wide up to the front of the Exchange, which is estimated at another million.

697. Now, we have got four millions, which is a good deal more?—No, it is two and a half millions, and I think you will agree with me that my estimate of two and a half millions is not an unreasonable one.

698. But you told me just now that it will be a great deal more?—No; the embankment from Parliament-street to Blackfriars' Bridge will be a million, and then the estimate from Blackfriars' Bridge to the Exchange is another million. One is to be paid out of the main drainage rate, and the other out of the coal duty. I venture to say that half a million more than those two millions will not finish those two great works.

699. Now, we have got up to the new street; but this Bill comprises all other new streets, and all other old ones, if you like?—We simply want the principle settled.

700. What number of new streets are you contemplating making in the next ten years?—I think that is a question which I can best answer in the way that the Duke of Wellington answered Mr. Lambert Jones; I can best answer that question by asking you, who is to pay? All the resources are exhausted. I do not suppose that the coal duty would be borne again, or that it would ever again be 1*s.* 6*d.* or 2*s.* I think there is an end to that. I am quite sure, representing a parish containing 300,000 inhabitants, many of them exclusively the poor, that there is a limit to the rating to be put; therefore, I do not see where the money is to come from, unless it comes out of the Consolidated Fund, which will not affect either you or me.

701. You would not like to increase the Metropolitan rates?—No, it is impossible; they have reached their limit.

702. Mr. *Powell.*] Do you mean their legal limit?—They have reached their legal limit.

703. Mr. *Denison.*] Then you do not think there is any probability of any more new streets?—London seems to be approaching such a plight, that I think we shall have to do all we can.

704. Then, if there are no new streets likely to be made, this Bill is for old streets?—No, it is for the new streets.

705. But old streets also?—I said in the outset of my evidence that I believe, with regard to old streets, in the first place we should not interfere with the City at all. The City streets are managed by a separate Board, called the Commissioners of Sewers; therefore, it is quite off the whole of the City, where the pressure is the greatest, except so far as we interfere with the new street from Blackfriars.

706. You would have no objection then, I presume, to the Bill being excluded from applying to old streets?—I should have the greatest possible objection, because I do not want that we should be obliged to come to Parliament every time we want a slight alteration, and then have 20 counsel opposing us, which would be a great deal more expensive than the thing itself.

707. Every time you made a subway, you do not want this opposition?—I do not want to have this kind of opposition.

708. But this is the usual kind?—I do not think it is very usual, because, with great respect, I am a shareholder in one of the great water companies, and I ask, why cannot they all join, and all appear by two counsel instead of appearing separately?

709. If you inquire out of the room, you will find that they do not appear separately?—I thought they did. I view the matter in this light, that we have

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a great expenditure of public money, and that we should take means to lessen that in some way or other.

710. Then it comes to this: you decline to have the Bill limited to old streets, and you are not going to take any more powers for new streets?—I do; but you must please understand that these are my own opinions, and not the opinions of the Board.

711. But you are the deputy chairman of the Board, as I understood you to say?—I am deputy chairman of the Embankment Committee. We are divided into committees. It was thought, I suppose, that I was the fitting man to be the deputy chairman of that great work, and therefore I am deputy chairman of that matter, and in that capacity I deprecate the breaking up of this beautiful road which would be paved at an expense of 12 *s.* or 15 *s.* per yard.

712. When was this road begun?—Southwark-street was begun, I should think, three or four years ago.

713. When did the subway scheme occur to you; about the same time or before?—Earlier; I brought forward the question of the subway under the embankment individually.

714. That being so, may I venture to ask why you did not apply for these powers in the Bill which you got enabling you to make this street as you had to make the subway?—I do not know; I know I had to coach the Bill through for the Metropolitan Board with 120 clauses in it, and I wish it had been introduced into that Bill.

715. But it was not?—No.

716. Nor specially into the Thames Embankment Bill?—I think not at that time; I suppose it was hardly thought of.

717. You told me just now, that it was not thought of when the Covent Garden approaches and subway were made in 1857. The Southwark subway was in 1858, and the embankment was in 1860; can you explain that?—I can only refer you to the infirmity of human judgment; that is the only reason I can give. It ought to have been, and we should have had no difficulty in getting a clause inserted into the Bill with a Select Committee consisting of 16 members.

718. Is it settled that the subway is to be made in the embankment?—It is, quite; it is contracted for, and is making.

719. Can you give us any estimate of the cost of the subway there?—I have a very distinct recollection that Mr. Bazalgette was asked to report upon it, and I have an impression that it was reported at 10,000*l.* or 11,000*l.*; it was brought distinctly before us. With regard to these vaults there is the ordinary provision as to all new streets in the City or elsewhere, which enables you to get a sideway when you are constructing vaults under the footpath; it enables you to get the footpath and the pavement finished, and the street opened, without waiting for the land to let. The land is let at so much per foot, so much ground-rent for each house; the party taking it knows that he will have to pay so much for the building of these vaults that are under the street.

720. We had from Mr. Marrable, this morning, some evidence as to the cost of the vaults, therefore I will not ask you as to that?—The cost of the drainage is thrown on the rating altogether.

Re-examined by Mr. *Phinn*.

721. With reference to the subway in the embankment, are there also proposals for carrying a railway through it?—Yes.

722. I suppose that would modify, to some extent, the position of the subway and the dimensions of it?—Probably it might, but the land which is being reclaimed from the river is far more than is wanted for the road in most cases. And in most cases it is proposed, by those promoting the railway, to put the vaults of the railway proper not under the road at all, but on the side of it. In some cases it interferes with it; in other cases it does not. There is a report from Mr. Bazalgette, which states the modifications which the engineers have mutually agreed to. That matter is before Lord Stanley's Committee, and where it does interfere with the subway there is no doubt it will be easily arranged to meet the joint difficulty. With regard to the reason why this subway is upon a different plan, it is a mistake to suppose, as is generally supposed, that it is to be a great street open to the river, on one side being houses, That is not at all so.

so. I believe there is no case in which that will occur. There are no rows of houses. It will be, to a large extent, ornamental ground, leading to the gardens, or it will be given up to other people to enlarge their gardens, giving 100 feet to the street; but there are to be few or no buildings.

723. Mr. *Powell.*] There is no reason why there should not be buildings?—The Committee will determine that; the design was to leave as much open space for the requirements of the people as could possibly be left. It is not a street in any sense of the word.

724. Mr. *Phinn.*] My friend, Mr. Denison, has confounded, I think, three things which we have been trying to keep separate; first, the new streets for which you have got power, and which are constructed, or constructing; that is one?—Yes.

725. Of course, you want to force the companies into the subways actually constructed?—We do.

726. Then there are new streets which you have not yet constructed, but which you want power to construct, with subways into which, of course, you want to force the companies equally?—Exactly.

727. Then there are old streets, with respect to which you must come for statutory powers before you can make a subway?—Yes.

728. Those are the three different classes?—Distinctly. I had that in my mind; for instance, if you want to make a subway through Pall Mall it cannot be done without an Act of Parliament, precisely the same as you would make the railway; because the vaults of the houses there, in many cases, cross the whole street, and join together in the middle. They belong to clubs, or private houses, and no subway can be constructed without giving notice to those parties of what we are going to do. It is the same with Holborn, or any of those crowded thoroughfares.

729. It is perfectly certain, that with reference to old streets such as Regent-street or Pall Mall, the Board must come to Parliament for powers to take the land for the purpose of making a subway?—Yes.

730. What the Board of Works want is, that if Parliament thinks fit to grant them powers to made a subway that the companies shall contribute a fair proportion?—Yes.

731. They are to come into it fairly and contribute, subject to arbitration?—Yes.

732. With reference to the question of contribution, my learned friend called your attention to the form of the 9th section: "The Board may, if they think fit, demand and receive payment, by way of annual rent or otherwise, from any company, such amount to be determined by arbitration." Do you assume, therefore, some payment?—Yes.

733. That might be altered to "the amount (if any)"?—Yes.

734. You would not object if the arbitrator thought that, under the circumstances, the company ought not to pay anything?—I am quite sure the Board would not.

735. Mr. *Powell.*] Do you not think that some principle should be laid down as to the amount to be paid by the companies?—I think in some cases it would be difficult to arrive at a principle. The principle I affirm is, what I believe to be a very moderate one, that they should pay 4 per cent. on what the thing actually costs, which is very small, in my humble judgment. They might say, under the circumstances of this particular case, "the houses are very sparse, and the rents we receive are very small, and your toll, however small it may seem, is really amounting to all our profit; therefore, we think it is not reasonable." It might happen that they might argue in that way before the Board. That would be a matter to be inquired into. If that is well founded, I cannot see my way to affirming a principle which would do injustice to the gas and water companies.

736. Do you not think there would be a great difference in the amount of compensation which might be allotted by different arbitrators according to the way in which they were appointed?—Of course you are open to that infirmity in the same way that the Government is with regard to very grave questions which they are constantly obliged to submit to arbitration with reference to the cost of the conveyance of mails all over England, Scotland, and Wales, but it would set itself right.

737. In this instance, it would be in the shape of a tax levied on these companies?

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panies?—Pardon me, I think not, if I am right; on the contrary, it would be very much in their favour, because I believe, practically, that the pipes laid in these subways could be painted, and, if necessary, accessible under all circumstances, and laid with great care without hurrying the workmen, and without having to take up the pavement. I believe a water-main carefully looked after and laid in that subway would last 100 years, because there is no breakage and no leakage. I have seen during the last four or five months a girder coming down Regent-street upon three trucks, drawn by 18 horses; it was 70 or 80 feet long, and the weight of that girder was pressing all over the surface in which the gas and water pipes were laid. It is only last week that I saw a casting coming over Westminster Bridge, drawn by 14 horses, which, of course, was pressing upon the surface in the same way. We believe that the saving to the gas companies, by using these subways, will be something very considerable.

738. That would entirely depend upon the amount settled by the arbitrator?—Of course, that would be settled by the arbitrator; if they said before the arbitrator, you have no right to be paid by us, because it is a great cost to us to have to lay the pipes in the subway, and it is infinitely greater than the cost would be under the old system. That is one of the grounds which the arbitrator would immediately entertain as to why they should not pay the rate at all. That is the way, I think, it would practically work.

739. *Chairman.*] Am I right in thinking that the Board of Works have no idea of what principle they should go on in assessing the rate?—Yes, they would ask for 4 per cent. upon the outlay.

740. Whether it is old streets or new streets?—I think they would probably ask that in all cases. I think with regard to old streets, the case would be at once met. We should not think of asking anything. I think the cost of taking up the pipes and laying them down again in the subway of an old street, would be so much, that it would be unreasonable to ask a public company to contribute.

741. Have you had any estimate made of the cost per mile or per yard that the companies pay for taking up their pipes and opening the ground?—No; they can show it. I do not know what it is.

742. Your Board have not?—No; all we are dealing with, is simply the course which is taken, which is open to your eye as well as mine, or anybody else's. In the one case, a trench is hurriedly cut and the pavement ripped up, and hurriedly put down. We think, if the pipes were brought into a subway and quietly laid down, that they would be very enduring, and at an expense far less than it takes at present.

743. Mr. Denison's questions went entirely to the principle, what ought to be paid?—I am sure we should be infinitely obliged to the committee if they would tell us what principle we are to go upon. With regard to getting the pipes in, if the sideway is not big enough, it is very easy to make it larger.

744. Mr. *Powell.*] There seems to be some difficulty in arranging the principle of compensation if the companies come in; can you suggest no basis at all?—Yes, the cost.

745. Have you taken, as your basis, the cost of the subway to the Metropolitan Board of Works, and not the saving of expense to the companies arising from the advantage of using the subway?—No, nothing whatever; we should not go into that.

746. Supposing there existed a certain number of companies, and that you had charged among them the 4 per cent., and after that a new company came in, how would you deal with them?—We should re-adjust it.

747. I still do not clearly understand about the powers of the Board. You divided it into three classes, did you not; one was the new streets; the second, streets such as Pall Mall, in which you would have to deal with private property; and then, a third class of streets, in which private rights do not exist?—The learned counsel was aiming at the possibility of means being found of continuing these new street improvements as new lines; that is what he meant.

748. Then you consider, at present, the Metropolitan Board of Works has no power, whatever, over existing streets?—No; I think not at all. We have no power of compelling the use of this subway, either for nothing, or for something.

749. Do you apprehend any of the difficulties arising from the gratings causing the

the horses to fall?—All I know is, that I have walked through it, and I found it is infinitely safer than the pavement. *William Tite*, Esq. M.P.

750. Viscount *Grey de Wilton.*] It is perfectly flush, is it not?—Yes.

751. Mr. *Powell.*] Has much inconvenience arisen in Paris, from the leakage of pipes in the passages which they now have?—I cannot say, because I have not been in to see; but I understand not. The Committee quite understand that the gas pipes are not introduced into Paris. For a great many years the system in the city of Paris was that there should be a cesspool under every house hermetically sealed, which was pumped out into carts hermetically sealed, which carried away the contents out into one of the suburbs, and was there formed into the very celebrated manure called *poudrette.* Modern inventions, since the introduction of waterclosets, have rendered that unnecessary; and there is now very little inconvenience in Paris arising from the sewage. 9 May 1864.

[The Witness withdrew.

William Carpmael, Esq., sworn; Examined by Mr. *Wilkinson.*

752. I BELIEVE you are a Civil Engineer?—Yes. *William Carpmael*, Esq.

753. You are also member of the Board of Works?—Yes.

754. You represent the district of Wandsworth?—Yes.

755. Have you directed your attention to the necessity of taking some step to relieve the inconvenience occasioned by the constant interruption to the surface of the streets from the gas and water pipes?—I have; I did so almost as early as the Board was formed.

756. That was in the year 1856?—Yes, when I came into office.

757. It was constituted in 1855, and the council was formed in the year 1856?—Yes.

758. As I understand you, from the time you first joined the Board, your attention was directed to the necessity of devising some mode of relief?—Yes, I had already long previous to that discussed with different persons the desirability of having some means of relief.

759. Having given your attention to the subject so long, are you of opinion that the present plan of subways, as it is now submitted to the Committee, is the most efficient mode of obtaining it?—Yes, subject to the variations which will from time to time be called for, to adapt them to special circumstances.

760. I need hardly ask you, although the subject has been so long considered, whether the actual experience yet acquired, has been but slight?—But slight.

761. Of course, the subways which have been already constructed are somewhat in the nature of an experiment?—In that sense, they are.

762. You yourself have given great attention to the engineering of water companies?—I have been a good deal consulted on the works necessary both for gas and water companies,

763. First of all, directing your attention to water companies, you have heard the evidence given by Mr. Tite?—Only a part of it.

764. You have read the petitions which have been presented in opposition to this Bill?—I have.

765. You are aware, directing your attention still to the water subject, that one of the objections urged by the water companies is, that the laying of the gas pipes and water pipes in the same subway will affect the water pipes injuriously?—I am quite confident that that cannot be the case. I am quite confident that no evidence can be given to justify that opinion. Supposing a water pipe and a gas pipe to be contiguous one to the other, and even in close contact in an open place like a subway, if there were an escape of gas at a joint, and if there were a defective joint in a water pipe at that locality, I can imagine, in some cases, by ceasing pumping, or other causes, an exhaustion and an indraught of air into the water pipe might take place; and that there might be gas drawn into the water pipe; but if a gas pipe and a water pipe were properly laid, such a result could not take place.

766. You are aware of the system adopted in the subway?—Yes; the proper way, according to my judgment would be to let the water pipe be upon one side and

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the gas pipe upon the other; because then, the two companies' mains being separate, the getting at one by one company would not be interfering with the other; that is to say, supposing the gas people were dealing with their pipes, if they were at a distance from the water pipes, they could not by possibility interfere with or damage the water pipes. The water companies also, in getting at their water pipes would not in any way interfere with the gas pipes. That being so, I cannot imagine that the atmosphere of an open-vaulted place, like a tunnel of that kind, could ever be so foul as that by any possibility, even with the bad joints of a water pipe, the water could ever be contaminated.

767. Directing your attention to the distinction between gas and water pipes, is it not the fact that water mains are constructed to resist a very much greater pressure than gas mains?—They are subjected to a very much greater pressure than gas pipes; the gas pipe is only subjected to a few inches of water pressure, while the water pipes are often subjected to a pressure of more than 100 feet of water; but whenever the water pipe is subject to that high pressure, bad joints will soon be detected by the pressure forcing the water out, and if properly laid above ground in a subway, that would be evidenced at once.

768. So far as regards the contamination of water pipes, of course the risk would be very much less than the contamination arising from gas pipes, inasmuch as the pressure in the main of the gas pipe is so very much less than that of the water pipe?—Ordinarily speaking, the water pipe would be full, and there would be no possible induction of the atmosphere from the exterior into the interior, and it is only in a very extraordinary case that there could ever be an induction of gas into the water pipe

769. You are aware of the height of the subway, are you not?—About 6 feet 6 inches.

770. You are aware also, that the pipes in the Covent Garden subway are laid slightly under the surface, are you not?—Yes; I suppose that was done through the habit of laying them under the ground, and they followed the same practice that they had been accustomed to; but, if I had directed it, I should have put them on the surface

771. You do not approve of that?—No.

772. You think they should not be covered with soil at all?—Yes, that is my opinion. I believe that in modern times investigation has shown that where gas pipes are laid in the ground, and there is a leakage from bad joints, the soil becomes so contaminated by the action of the water and the gas, as to act very prejudicially upon the gas pipes and also upon the water pipes contiguous thereto. I think it of the greatest importance that the pipes should be kept from being in a damp and impregnated soil, both water and gas pipes; and, therefore, as one can get better access above the soil to both water and gas pipes, they should be above the surface, and perfectly accessible at all times.

773. All those are reasons which induce you to think, that even apart from other considerations, the safety of the public would be more promoted by the arrangements of pipes in subways, than, as at present, they are arranged?—Certainly; I entertain no doubt about it.

774. I understand you that where there are, as in this case, several states of atmosphere intervening between the one main and the other, there is not, in your judgment, the smallest risk of the water pipes being contaminated by the escape of gas?—Certainly not. The subways being ventilated, no foul state of atmosphere could ever exist in them for any length of time.

775. Do you consider that the gas ever escapes through the actual metal of the gas pipes, independent of the joints?—Certainly not. It must be a very extraordinary pipe if ever it could do so; it could only be a very bad pipe which ought never to have been laid down.

776. I understand you the great risk is in the joints?—In the joints or in breakage, which will occur occasionally by the pressure of the earth, or the unsoundness of laying, or from the pipes being supported only at long intervals; if they are rammed down, and heavy weights come upon them, they may crack. Any defect of that kind cannot happen in a subway, as the pipes cannot be under pressure; they will be subject to their own weight, and nothing more.

777. Did you hear the instance which Mr. Tite gave, of the pressure resulting from

from an immense iron girder going over the surface of the street?—Yes, I heard him mention that, but everybody has observed that over and over again.

778. Would it not be the case, that an instance of that character more effectually disturbs the pipes laid in trenches, under the old process, than could possibly be the case if they were laid in subways?—The joints of pipes which are buried as at present, are liable to be more or less influenced, depending upon the quantity of traffic. In a subway that never can happen, because there will never be any jar which can be communicated from the surface of a roadway to a pipe lying on the bottom of the subway.

779. Do you think that if the present system of laying pipes in trenches in the road were maintained, that it would be possible to protect them with anything like ordinary safety from the continual disturbance occasioned by the increasing traffic of the streets?—They would be more liable to accidents by reason of the greater difficulty of laying them in the first instance, and they would be liable to greater pressure and greater jars by reason of the greatly-increased traffic.

780. Have you had instances brought under your notice of danger resulting from carelessness in laying down pipes originally occasioned by the hurry?—I have heard of it from time to time.

781. Instances, for example, of workmen having soldered two pipes together on the surface, and then lowered the two pipes together?—I have seen it done constantly; nothing can be more improper. I believe it is a constant practice now for engineers to put in the specification that that shall not be done, but it is done nevertheless.

782. In practice, it is still done?—It is done; I saw it done a few months back in Chancery-lane.

783. Is not that a very dangerous operation?—You cannot make good joints, and maintain good joints by such a mode of laying pipes.

784. That is soldering two pipes together on the surface, and lowering them so soldered?—Lowering them down with ropes, after two have been so joined.

785. The subway would, of course, give greater facility for inspection and the treatment of pipes as might be required?—Yes; they are always accessible.

786. Do you think there would be sufficient opportunity given for painting them, or coating them with some impervious substance?—No doubt, if they should ever want anything of the kind; I think it would be always desirable to paint the joints of gas-pipes laid in the subways with white lead, because an immediate indication would be given if any amount of escape of gas took place at the joints; it would turn the white lead into blue lead.

787. I understand you then to say that painting with white lead at the joints, would confer one additional means of safety in giving detection of an escape of gas?—It would not only make a better joint, but it would indicate if there was any escape passing out through a joint.

788. Before we quite leave the question of water, I should like to ask you, are you interested yourself in water companies?—Yes, I am a considerable shareholder in one of the companies.

789. Has anything occurred within your experience to give you the impression that a great misconception prevails on the part of the water companies?—Yes; I heard with very great surprise at a meeting the other day, from a report of the directors, that they were anticipating ——

790. What company was that?—The West Middlesex.

791. Is that one of the companies whom we have the honour to see here?—Yes, they are represented here. I heard they were alarmed in respect of two points: first, that they would be rendered liable to great cost in putting the pipes in the subway; and, secondly, by being in company with gas pipes, the water supplied would be liable to be contaminated by the gas. I certainly was greatly surprised at that, and I stated at the meeting, in my opinion, nothing could be more absurd than to expect any such consequences.

792. *Chairman.*] What is your opinion upon the point of expense; have you any knowledge of that?—I have a general knowledge of it.

793. Do you know what is the cost of the present system of laying down and repairing pipes?—The present cost is very considerable, by reason of this: first of all, they have to dig a trench ——

794. What the Committee wish to know is, what it is in pounds, shillings, and pence?—That you must get from another witness. If I had known that I should have

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have been asked that question, I should have come prepared. I know it is very considerable, because I happen to be auditor of that very company, and therefore the bills for doing it come before me.

795. Mr. *Wilkinson*.] I understood you to say that a misconception existed at that meeting which you attended?—Yes.

796. Upon that you are not prepared to give the details?—No; but I am prepared to say that the laying of pipes in a subway could be done at a much less cost than it could be done in the trenches.

797. What other point of misconception arose at that meeting?—The possibility of the contamination of the water by reason of the water pipes being in the same subway as the gas pipes.

798. Did you, at that meeting, meet both those objections as to the contamination and the question of cost?—I met it as I meet it here, by stating that there is no possibility of the atmosphere of a subway ever being so foul as to contaminate the water.

799. Was the result of the observations, which you offered in explanation of those misconceptions, to alter the opinion of the meeting?—I think the observations I made allayed the alarm that was created by the report of the Directors.

800. Leaving this meeting, let me direct your attention now to the comparison between your present system of gas-pipes and water-pipes; is it not within your knowledge that great complaints have been made by the gas companies of frauds practised upon them by consumers?—Yes.

801. And the difficulty of detecting those frauds?—Yes.

802. Comparing those two systems, which, in your opinion, would be the most beneficial to the gas companies?—Having the subway, because a company can always put a gas-meter on to any service pipe without the party whose supply it is knowing anything about it, so that the company would instantly know whether they had a just suspicion or not.

803. There would be every facility then of detection?—Yes.

804. Without using any offensive measures to consumers?—Yes; I think that is very important. That is one of the things that has occupied the attention of gas-meter makers for many years, to enable gas companies to know how they could ascertain where they are defrauded, and when they have honest customers.

805. In fact, it is not an unusual practice now on the part of dishonest customers to introduce a pipe beyond the meter?—There are a variety of means used, such as tilting the meter under certain circumstances, so as to alter the relative position of things, whereby the meter does not register all the gas that is supplied to the consumer.

806. The contrivances which have been in use were confined to the soil?—No, the gas meter is not in the soil; the service pipe is in the soil.

807. Therefore, there would not be same facility in examining the service pipe which there would be afforded in a subway?—No.

808. Now, let me direct your attention to the question of explosions. Do you think that the risk of explosions would be greater in subways than at present?—Certainly not.

809. Will you state to the Committee why?—The explosions that we have had are not very numerous; but they have usually been in confined places where no ventilation exists at the upper part of the confined chamber within which the gas is. Whenever gas escapes, it will mix with atmospheric air very rapidly, and if there is not good ventilation, an explosive mixture may be formed, and, if formed, and the chamber in which the gas and the air become mixed is not ventilated, any light coming there will cause an explosion; but, in the subway such as proposed, the whole of the roof at intervals is ventilated, so that under any circumstances even a large escape of gas could never remain constantly in any one state of mixture, but it would pass from the minimum up to the maximum of atmospheric air as early as possible, as if it were in the open atmosphere, or nearly so. It would not be quite so open as the open atmosphere, but it would be almost in that condition. There would be no confined position for an explosive mixture to exist in for any length of time.

810. In your judgment, are the openings provided in these subways sufficient to prevent that confined space?—I think they are; they might be increased to any

any extent; if they are not ventilated enough at the present moment these subways are capable of any degree of ventilation; but according to my own judgment, that which is already provided is sufficient.

811. Let me direct your attention to the danger which the petitioners allege would be caused by the necessity of working with artificial light; do you concur in the apprehension of that danger?—Certainly not; I should say these tunnels might be illuminated with gas. If it was known that there was any large escape of gas the ordinary remedies would be had recourse to by the use of safety lamps as heretofore; but according to my judgment, even safety lamps may not be required. Supposing a very large gas main were to be broken by some unaccountable means, and the whole of the gas escaped before the point of escape could be traced, you must deal with it the same as you would at the gasworks.

812. Of course, at the gasworks there is always a large amount of pipe open to the air?—In some cases, and in others in covered ways.

813. Supposing the pipes to be laid with very great care, the necessity for reparation will be very much lessened in a subway?—When once sound joints are made to pipes, both water and gas, in the subway, it is hardly possible that any defect can arise in them, except in the case of water pipes, by an excess of pressure taking place

814. You alluded to the pressure of water on gas pipes?—Yes, but in gas pipes I cannot imagine well-made joints can be easily injured.

815. Of course, there will be the same facility in providing for the water which accumulates in gas pipes in a subway as there would be on the surface?—Yes, all that will be provided for; there is no interference with that.

816. I need hardly ask you, of course, with reference to laying gas pipes originally, the gas pipes themselves must first be completed before the gas can be admitted at all?—I should imagine so; at present, one of the causes of making bad joints is, that they are obliged to dig out the trenches, and fill up their work with great rapidity, whereas they may do it with great deliberation in a subway, because the workmen will not be interfered with by the traffic of the streets.

817. Can you tell the extent to which the gas companies suffer at present by leakage?

Mr. *Richards* objected to the question.

818. *Chairman.*] Do you know it of your own knowledge?—I do not know it of my own knowledge except as to being asked as to the means of making joints to prevent an escape. I know there is a very great escape, having heard it from gas engineers.

819. Mr. *Wilkinson.*] You have been several times consulted, have you not, both by gas companies and water companies?—Not by gas companies but by gas engineers.

820. Have you been consulted with reference to the mode of saving the immense loss incurred at present by the leakage?—No.

821. Let me direct your attention now to the subways in Paris; have you seen those yourself?—Yes.

822. When did you see them?—I saw them about three weeks ago.

823. Do they coincide with the subways here?—No; they are sewers.

824. The sewer itself is in the subway, but separated by a complete floor?—The whole structure is in a tunnel. At the lower part of that structure, there is a canal with footpaths or ways on one or both sides. The ordinary channel for the sewerage is down the canal, but on inquiry, I found that not only was that channel filled, but it rose considerably at times into the whole interior of the subway or sewer.

825. The workmen being obliged to work of course in the air affected by the sewer?—Any workman being there for any purpose, would have to work in the atmosphere of the sewer.

826. Do you think that the subways, as already constructed in Paris, are a fair example of what may be expected from the subways of London, with regard to the laying of the gas and water pipes?—No, certainly not. They are highly inconvenient to lay gas and water pipes in, whereas the object and end of those in England is to permit of the laying of gas and water pipes in the most convenient

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nient and efficient manner. The workmen would have to work in a good atmosphere, and not be subject to the casualties of rain-fall or an excess of sewage.

827. Then, generally, as regards the gas companies themselves, do you think that the substitution of the subways system for the present system will be beneficial or not?—I think it will be highly beneficial.

828. To them, apart from any consideration to the public?—Yes; they will be able to perform their work with efficiency, and not at all interfere with the traffic on the surface of the streets. They will not have to make trenches in a hurry, and lay their pipes down in a hurry, and to make their joints in a hurry. They will not, when they have made their joints and laid their pipes, be subjected to the filling in of those trenches or the cost of them. Nor will their pipes be subjected to the pressure and injury consequent on the ramming in of the soil in making good the road, or the traffic of heavy carriages after the soil has been so rammed in.

829. You are aware, I presume, that they are not only obliged to reinstate the surface of the street or road which they dig up, but to keep it in repair for five or six months?—They are obliged to make it good themselves, and then, I think, if I am not in error, the companies have to pay the parishes sums of money from time to time for making good where there is any defect afterwards.

830. The cost of keeping in repair is at any rate borne by the companies?—Yes.

831. Putting it into repair and keeping it in repair for a certain time specified?—I cannot speak as to a certain time specified, but it is put into repair by the companies. I think, in many cases, if not all, the companies have to pay the parishes or their officers for making good any defects that are found, even after the companies have done their part.

832. Resulting, of course, from their operations?—Yes, anything resulting from their operations.

833. Do those same observations apply to water companies also?—I believe it applies to both; they both have to make good.

834. With regard to water companies there is an absence of the risk of explosion?—There is no explosion, but the pipes sometimes blow up from great pressure.

835. As a member of the Metropolitan Board of Works, you have directed your attention to the interests of the ratepayers in this question, have you not?—Yes.

836. I should presume you would hardly recommend the Metropolitan Board of Works to incur the very great expense of constructing these subways unless the prevention of the nuisance to the surface of the streets which it is their object to effect?—Certainly not.

837. Do you think that can be accomplished without some compulsion of the water and gas companies to place their pipes within these subways upon fair and proper terms?—They are perfectly useless if the gas and water companies and telegraph companies are to retain their power of breaking up streets, because you cannot force them to come in, and if you cannot force them to come in, they will not use them, or at any rate they would only use them upon their own terms.

838. Would that be a fair arrangement?—I think not.

839. If there was an opposition on the part of the companies, it might occur that one would come in, and others would not, and that would not be a desirable arrangement?—No, because if a part come in and another part remain out and retain their powers, though the quantity of nuisance to the public would be decreased in proportion to the quantity coming in, still the breakage of the road by any parties would be injurious, not only to the ratepayers, who are immediately living on the spot, but also to the traffic of that portion of the road which was broken up from time to time.

840. Will you state to the Committee your opinion as to the mode in which the question of remuneration which the Company should make to the Board of Works for the expense incurred by them in these subways should be regulated?—My opinion is, that the ratepayers will be benefited, so far as the traffic can be carried on, without inconvenience and hindrance; I consider that the gas and water companies and other companies will be benefited, in regard to the convenience of laying their work and doing it well, and its being open to superintendence and examination at all times, they will also be saved the money which it is now necessary to

to expend to dig up trenches, and to make good any damage that their pipes are liable at the present time to sustain. I think that the question will vary with regard to the amount of money that ought to be paid on the one hand and the other.

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The *Chairman* states that the Committee are of opinion that evidence as to cost will be better given by another witness.

Cross-examined by Mr. *Richards*.

841. You are a member of the Board of Works, I believe, are you not?—Yes.

842. And one of the benevolent Promoters of this Bill?—I am a Promoter of it; I do not know whether it is benevolent or not

843. You are going to benefit everybody but the gas companies?—Our desire is to benefit the public.

844. You have been consulted by gas companies from time to time?—Not by gas companies; but I have by engineers to gas companies.

845. You generally have found them tolerably competent to manage their own business, have you not?—Yes, they are very clever men many of them.

846. Have you found that if any scheme were presented to them, whereby there would be a great and obvious saving of expense, that they have always adopted it, or opposed it?—I have not found them adopt it, generally.

847. Do you think that if the companies found a great and obvious saving of expense from these subways, that they would not adopt them?—I am not prepared to answer that question.

848. Because you know nothing about the cost?—No, it is not at all with regard to the question of cost; but on the question of departing out of a beaten track that they have pursued for a great many years, and to give up rights which they now possess by Act of Parliament. I have always found bodies of persons very slow to give up any right of that sort.

849. Then, in fact, you find they do not manage their business well, and that they do not adopt the best plan when suggested by the Metropolitan Board of Works?—That I do not know; this is the first instance we have had to enable us to judge.

850. Now, we will pass to the place which has been cited as an example more than once, though now it seems we should take it as a warning, Paris. Are you aware in what length of subways gas pipes exist in Paris at present?—I do not know the length. There is a gentleman here who has got more details than I have.

851. Do you know that in all the lately constructed subways or sewers of Paris no gas has been laid down at all?—I know this; there are two departments of management with reference to the laying down of subways in Paris, the Municipal and the Imperial; the gas pipes and the water pipes are laid in that portion which belong to the Imperial engineers. I believe that the Municipal engineers have not laid any gas or water pipes in their works.

852. Do you know that gas has been laid down by the Imperial engineers?—Yes.

853. In a recent subway?—No; not in a recent subway. They are not in the municipal portion.

854. They are in the original subway?—No.

855. In short, you have not been in to see them?—No.

856. It is hearsay evidence, what you have been told by somebody else?—I obtained my information from the municipal officers.

857. In fact, from somebody else?—From the municipal officers.

858. I am told that the gas no longer goes through, and my friends want me to ask you that question?—I should doubt that statement, because I certainly have every reason to believe that gas does go through, and has done for many years.

859. But you have never seen them?—I have never seen that portion.

860. Now, you say, with very great confidence, that the proposed ventilation of the subway will necessarily prevent explosion; do I not understand you to say so?—It will prevent explosive mixtures taking place.

861. Have you ever known an explosion take place in open trenches?—Yes; at the mouth of the main.

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862. But in an open trench?—At the mouth of the main.

863. But an open trench where the gas could instantly rise?—The gas pipe being in that trench.

864. But the gas coming into the unimpeded air?—Yes.

865. Do you remember the case of the explosion at Holborn, which blew in four or five shop fronts, and killed four or five people?—Yes.

866. Was not that an explosion which took place in an open trench?—It was. I could imagine that the same thing might take place if it was in a subway, but I cannot imagine that anybody would lay a pipe in a subway, or even in an open trench, in the manner that that was laid. An equal degree of carelessless would cause an explosion anywhere.

867. Does it not come to this, that although the number of escapes would probably be very much diminished, the consequences of the explosion would be very much more fearful than they are now, if a gas explosion takes place in the subway?—No; I think not. I think anything like good work would prevent anything like that which took place in Holborn.

868. If there is any imperfect work, would not the consequences be very much greater than they are now?—I cannot imagine, by any leakage, however careless, any quantity escaping to produce an explosion in a subway. The means of putting in service pipes are very perfect at the present time. You were asking me just now whether gas companies were very prone to follow up new and attested inventions and discoveries. I do not, for instance, find that instruments which enable parties to make the joints of pipes are used generally.

869. Were you present when Mr. Marrable was examined?—No.

870. You did not hear him state that, as to this fancy bit which they have got in Covent Garden, there was any escape?—I did not.

871. Although the houses are not completed the whole length of the street?—Yes, I can imagine it being laid down so carelessly as to cause an escape; but it does not follow that, because there is an escape, there will be an explosion.

872. You have had it put to you that a subway would be of great advantage in stopping the frauds which we hear are perpetrated by consumers; do you really mean to assert that?—I do; the consumer has a gas-meter, and very often the companies will suspect that a customer is not paying for all the gas that he consumes, and they resort to various devices in order to ascertain whether he is honest or not. They will have nothing to do but to go to the subway and put on a meter to his supply pipe. That testing meter will tell exactly what quantity of gas passes out of the main to the consumer; and if that does not tally with his meter, that he is paying upon, then they know that a fraud is committed.

873. But the supply pipe is to go to every two houses?—No; every man has his own supply pipe.

874. That is not the scheme that has been suggested by Mr. Bazalgette?—I unhesitatingly say that it is; there is a gallery to every two houses, but no communication of pipes to two houses.

875. *Chairman.*] Do you know the fact, of your own knowledge, that there is one pipe to each house?—Every gas engineer will tell you that.

876. Mr. Bazalgette differed from you?—I heard Mr. Bazalgette, and I think he stated that there was one of those side passages. This is the subway (*referring to the Diagram*). There is a side passage leading to the cellars in that passage, which is three feet wide; the water supply pipe will lay for each of the houses, and the gas supply pipe will lay for each of the houses; but the two pipes will not be in any way connected.

877. The impression upon my mind was, that Mr. Bazalgette said that the company could tell that two houses were cheating, but he could not tell which of the two houses?—I do not think Mr. Bazalgette could have understood the question, or he would have known instantly that each house would have a supply pipe. I did not understand him so myself. Every gas engineer will tell you that each house has its own supply pipe for gas. By adopting the subway, the gas engineer can put an extra meter on the supply, and he can compare it with the gas meter in the house.

878. Mr. *Powell.*] Might it not be arranged in this way: that you would take a pipe along the lateral passages, and make the letter T, one part going to the right hand and the other to the left?—That might be.

879. Mr. *Richards.*] That, in point of fact, is one of the advantages you propose on behalf of the subway?—One of the advantages, with regard to the gas

gas companies. I have been consulted for years as to the formation of junctions with gas meters, in order to prevent frauds, because frauds are carried on very largely indeed.

880. Did you ever, in your various consultations with water companies or gas companies, hear of a gas or water company who approved of this Bill?—No; I have not had any consultation with either as to this Bill.

881. You attended this meeting, you say, and there the questions which seemed to press upon the shareholders was the question of the cost and the question of contamination?—Yes.

882. You have told my learned friend that you met both those objections by your observations, and changed the opinion of the meeting?—No; I stated that I thought I had mitigated the impression the Report of the Directors had produced.

883. And the question of cost, I understood you to say?—I have not said so yet; I know this, that the whole of the money now paid by gas and water companies in digging out trenches, and laying pipes in those trenches, and making good those trenches, would be all saved to those companies.

884. Have you the least conception what amount that is?—I could soon get it out.

885. You do not know now?—I do not know now.

886. Have you gone into the cost of laying the pipes in the subways?—There would be a material difference between the cost of laying the pipes in the trench and in the subways as regarded the workmanship.

887. To come to a short practical question, what would be the cost of laying a pipe 50 yards?—I have told you I have nothing here at the present moment which enables me to state that.

888. The interest of the ratepayers is also regarded by this Subways' Bill?—Undoubtedly, it is essential to prevent the traffic of the streets being interfered with.

889. Supposing Parliament were to admit that the companies' pipes are to be taken up, and another set of pipes to be laid down in the subway, and a certain amount charged to the companies, out of whose pockets do you suppose that must ultimately come?—Out of the ratepayers', whether in the one form or in the other.

890. So that the question of the benefit to the ratepayers really depends upon the comparative cost of the two systems?—The first benefit to the ratepayers will be that the traffic of the streets and the access to their shops will not be interfered with, which is a material benefit to them; but it is one that cannot be calculated in pounds, shillings, and pence.

891. But the question of the benefit to the ratepayers depends entirely upon the comparative cost of the two systems?—No; the money cost can only be assessed between the ratepayers and the companies who use the subways. I assume that the subway costs a certain sum of money; that 4*l.* per cent. per annum is a proper representation of the outlay; that outlay only benefits certain parties, one of those parties being the ratepayers; the other parties are the gas companies, the water companies, and the electric telegraph companies.

892. You say that the ratepayers will have ultimately to pay the rent which you propose to subject the companies to?—In this sense it will be so, because the ratepayers who have to pay, more or less, for these subways, have to pay for the water and gas which is supplied to them; and the price of the water and gas must be more or less dependent upon what the companies have to pay.

893. Then, if the rent which is imposed upon the companies should in fact turn out to be heavier than the annual sum they now pay for laying their pipes, that would fall upon the ratepayers?—It would.

Cross-examined by Mr. *Toulmin Smith*.

894. You stated, that if there was a defect in the gas and water pipes at some points, there would be an indraught of gas?—There might by possibility, in some state of circumstances, be an indraught into a water pipe; unless there be an indraught, however foul the atmosphere, the water will not be contaminated.

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895. That seems to imply that in your opinion gas is not at all diffusable, and that it only leaks at the point where there is a leakage or a joint which is defective?—No; if it is diffusible in the soil I can imagine that water in a pipe laid in the soil would become contaminated if there were an indraught into the water pipe, but if there were an escape of gas into the subway the diffusion would be so large, and the contamination of the air so small in the vicinity of a bad joint of a water pipe that no indraught, if it took place, would damage the character of the water in the pipe.

896. Do you mean that there is no leakage from a gas pipe except at a breakage or an imperfect joint?—I am perfectly confident of it.

897. How do you explain the circumstance, that when soil round a gas pipe is taken up that there is so much smell?—From the percolation of the water and gas into the soil.

898. Will there not be the same percolation?—No; it will be all in the atmosphere, and the diffusion will be instantaneous, and the getting away of the gas not being retarded, as it is in the soil, the impregnation of the atmosphere will be very slight, whereas the impregnation in the subsoil is very great.

899. How do you propose to ventilate the sewer which is below these subways?—They have their own channels of ventilation independent of the subways.

900. Separate from the surface?—Yes.

901. Do you mean besides the man-holes?—Yes, those are for the subways proper.

902. You suggest that in your opinion the pipes of the water-works should be on one side, and the pipes of the gas company on the other?—Yes; and for this reason that the two companies should be separated, and that getting to the gas pipes by the gas engineer, should not, by any possibility, cause any damage to the pipes of the water companies, with which they have no interest.

903. Do you apprehend then that only one gas company and one water company are to be in one subway?—No, quite the reverse.

904. Are you supposing that there may be two water companies or two gas companies in the same subway?—That would be very seldom because Parliament has arranged a certain area for one company, and a certain area for another.

905. Has it not resulted from that that there are as many as four gas companies having their mains in the same street?—Yes, that would involve this: that supposing an Act of Parliament was ever granted for making a subway in that particular street, then the engineer would be called upon to devise and arrange the subway or subways, in order to meet that very large requirement; but there is no difficulty, as a mechanical problem, in doing that.

906. But it affects greatly the cost and the expense of working out that problem?—No doubt.

907. In your opinion, is the system of chairs which has been recommended a good one?—I think chairs or pedestals at or near the ends, or in the middle of a pipe, is a convenient one, because it would enable the inspector as well as the workmen to see first that the joints are well made, and that they remain well made, and to that extent I approve of pipes being laid some slight distance off the surface of the land.

908. As you are familiar with mechanical science, do you think that gravitation will have no effect upon the weight and contents of a line of pipes of 30 or 36 inches diameter, fixed only upon two chairs?—With a pipe of that dimension, I should not think of putting a pedestal; I should have a bed or ridge on purpose for that.

909. Mr. Bazalgette having exactly the same question put to him, stated that they would be quite safe?—I believe if they were put at reasonable intervals they would be quite safe; but I think that a discreet engineer would put a longer bearing if he had a very large pipe.

910. Then, with the pipes in the way you suggest, gas on one side and water on the other, what space do you think there should be between the first pipe and the second, in order to enable the different pipes to be reached by the workmen?—I should say a foot all round; I think that desirable, but not absolutely necessary, and I think in order to have all the pipes accessible at all times, that a foot all round, or from eight or 10 inches would be proper.

911. You

911. You think there is no danger of a workman fracturing a small pipe under those circumstances?—Certainly not.

912. You stated that it would be a great benefit to the gas companies if the gas-meters were placed inside to save them from fraud?—Yes.

913. What would be the effect if, as we are told by Mr. Bazalgette, it is an essential part of the scheme that these subways should be used as thoroughfares by the turncocks in order to turn on and off the water?—That cannot interfere the slightest in the world; if a meter were put upon any of the services, it would be out of the way altogether. Supposing the gas pipe were here, the supply would be coming off in that direction (*illustrating it*).

914. What is the size of those side passages?—About three feet wide. I am speaking from memory now.

915. What is the size of the pipes?—The size of the service pipes is about an inch or an inch and a half.

916. What is the size of the meters?—About half as big as that clock.

917. What is the height of the passage?—I take this as six feet six, and then I say that is three feet.

918. Do you think that would be a convenient access for the inspectors of the gas companies?—Perfectly.

919. You think there is no chance whatever of the water companies' servants ever straying into there by accident?—The water companies' servants would have perfect access to them, if they have a service pipe in the same place, the presence of the meter would not interfere with either one or the other.

920. You think you would be able to ascertain the measurement of that meter without a candle?—No.

921. Do you think that if you had a candle it would be perfectly safe?—Perfectly so.

Cross-examined by Mr. *Bruce*.

922. You stated that in Paris the sewers are different; but are not the sub ways on a different principle there?—Yes.

923. Had you an opportunity of conversing with any of the Paris engineers or gas directors?—Not the gas directors. I had an opportunity of conversing with the engineers of the Government, and they gave me sections of all the sewers which they had made. I examined them with very great care.

924. Was not the result of that that they are universally against the introduction of gas and water pipes into the same subway?—No, quite the reverse. To show you that the engineers of Paris do not consider that the water will be contaminated, they have put the water pipes into their sewers, subject not only to the escape of gas, but also to all the fumes and vapours arising from the sewers, and yet their water is not contaminated.

925. You have introduced the question of contamination of water, which I did not. I want to know, in the first place, whom you saw; will you give me the name of the engineer?—I really do not know the names of the gentlemen I saw at the Hotel de Ville. I was introduced to the heads of the establishment.

926. Did you see M. Belgrand?—I am not quite sure whether I saw him.

927. Did you see the first inspector or the second inspector?—I saw three or four gentlemen; I was handed from one to the other, but I did not catch either of their names.

928. You have stated that in one case they had used gas and water pipes in the same subway?—Yes, that was in the Imperial portion of the structures.

929. There has been no other attempt since that to unite gas and water in the same subway?—I cannot answer yes, or no, to that.

930. You did not make any inquiry as to that?—Yes, I got a great deal of information.

931. What was the result of your information?—That there had been gas and water pipes laid down about nine years ago, and that they still remained.

932. Can you give any place where they have been laid down in Paris since that?—No, I cannot. What I stated in my examination in chief, so far as my information obtained goes, was this, that the Imperial engineers did not hesitate at all to lay down gas and water pipes together, and that they had no fear of contamination of the water; but that the municipal engineers had not done it.

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933. Unfortunately you cannot give me the names of any of these Imperial engineers?—No, I cannot; I was handed by the prefect to the officers to give me all the information they could.

934. You do not know either their names or the places where they have laid down these pipes?—I got the particulars, because they gave me a section of their different sewers and the pipes that were laid in them.

935. Have you got the section with the names of the different streets?—This is a copy of the one that I signed. I signed it in Paris, in order to know the document again. Here is the Boulevard Sebastopol, which is represented to have got two pipes. Mr. Bramwell and Mr. Hemans will be better able to tell you what they are.

Re-Examined by Mr. *Phinn*.

936. You said, that however this was made it would ultimately come out of the pockets of the ratepayers?—In some form or other.

937. Whatever the gas companies pay, they cannot make more profits than 10 per cent., although they contrive somehow or other to evade that sometimes, yet the Legislature says that they are not to divide more than 10 per cent., and then they are to reduce the price of their gas?—Yes.

938. The moment that they come to 10 per cent., then they have to reduce the price of their gas?—Yes; the ratepayers would be benefited by that.

939. Then you were asked with reference to streets where a great number of these pipes would require to be laid, that is, in streets for which you have actually got powers for the construction of subways. You do not anticipate a large number of pipes to be laid?—Not a large number.

940. For instance, the Thames Embankment?—For the Thames Embankment from Westminster to Blackfriars the supply will mainly be for the street itself; there will be very few residences.

941. Would you rather call it a road than a street?—There would be the road lamps, and very few supplies to houses; it would be only on one side of the road.

942. And not much water?—Very little water, except for watering the roadway itself. There would be a considerable quantity of pipes from Blackfriars to the City.

943. *Chairman.*] What is your idea of the principle which is to be laid down with regard to payment?—The principle which strikes me as the proper one is this; whatever the cost of the subway may be, then about 4 *l.* per cent. will be a fair representation of that constantly afloat in some shape.

944. You have taken the ratepayers view?—I say the ratepayers ought to bear part of that, and I think the companies ought to bear part of it.

945. What proportion?—That will vary; for instance, in some cases the water or gas company would only require to lay mains in a subway commensurate with the supply of the houses on either side. I do not consider that they ought then to pay so much for the use of that subway, as when a subway is placed between two large systems of gas and water pipes, and thus facilitates the connecting up of the two systems; when companies get a larger benefit from that things, I think they ought to pay for it.

946. Are you at all aware that the Act does not limit it to 4 *l.* per cent.?—But I should think the arbitrator would.

947. Would your Board be content to limit it to 4 *l.* per cent.?—I am not the Board: that is my opinion, that if 4 *l.* per cent. is represented in some shape or other, the Metropolis proper should, by reason of the benefit derived from the traffic not being interrupted in any way, bear some portion, and a reasonable proportion, of the whole cost.

Mr. *Phinn* stated that the Promoters were quite ready to put in a proviso that they should not claim, at any one time, more than 4 *l.* per cent. upon the outlay.

The *Witness.*] Then, I think the companies ought, in proportion to the benefits they derive, to pay a certain sum. If the subways are not occupied to the full by the companies, I do not think the companies ought to

to pay for it. I only think the companies ought to pay in proportion to the benefit they derive. I do not know any mode of getting at that but by an arbitration.

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948. The *Chairman.*] Do you think it would be fair that, if the public receive a certain benefit, and the companies receive a certain benefit, that the public are to pay nothing, but that the companies must pay?—No, I never imagined that the Metropolis proper, upon the surface of the road, were to pay nothing. In my judgment, they ought to pay a certain proportion of the whole cost, having the enjoyment of the pavement not being broken up. I think shopkeepers get a good benefit by not having their trade interfered with. If I were an arbitrator, I should set against that 4 *l.* per cent. the benefit derived by the uninterrupted user of the roadway, and then I should endeavour to ascertain what was the cost of laying down and making good trenches, and then I should endeavour to ascertain the cost of laying down and maintaining the subway; and I should endeavour, as near as possible, to arrive at what was fair to be paid upon the part of the public in general, and what was fair, according to the quantity of user by the companies, for them to pay.

949. Do you think it fair, that if it costs the company 600 *l.* per mile to lay their pipes, that the company should pay 300 *l.* and the Metropolis 300 *l.*?—I do not say that it would be the proper measure. If the company were saved 600 *l.* rates, and the Metropolis were prejudiced to the extent of 600 *l.*, then the case would be equal; but I think that the fair thing would be to go before an arbitrator.

950. Mr. *Powell.*] Is it your opinion that the saving to the company ought to be an element in the calculation?—I think so. The saving to the company in opening streets, and making good streets, and the waste by reason of leakage constantly arising from bad joints, are elements against such companies which ought to be taken into consideration. The benefits derived by the public on the surface of the road ought also to be taken into consideration, and those ought to be elements by which the arbitrator should arrive at his result.

951. Viscount *Grey de Wilton.*] It would be very difficult to estimate what the ratepayers alone would gain by that, would it not?—I do not think there is any rule that would enable us to measure the pounds, shillings, and pence value; but they being benefited, ought to pay in respect of that benefit. I consider that our first object should be to keep the traffic of the streets uninterrupted.

952. Mr. *Floyer.*] Do you not think that the local residents who hold houses in the streets where these subways are carried, ought to bear a part of the expense?—I think that the measure as against them would not be large; but I do not think they suffer so much very often by the interference or interruption of a road as the general public do; therefore, I do not think it would be fair to visit the residents on the spot with a large portion of the payment. I think it is one of these things that the general ratepayers of the Metropolis should bear as a whole.

953. You put it then, generally, that you would divide between the public and the companies?—Yes, the ratepayers in general.

[The Witness withdrew.

Mr. *Lewis Henry Isaacs*, sworn; Examined by Mr. *Phinn.*

954. I BELIEVE you are the surveyor of the Holborn district?—I am.

Mr. *L. H. Isaacs.*

955. And as such surveyor you have the charge of the foot and carriage pavements in the district?—I have.

956. Have you a return of the applications for opening the roads in the district for the last five years?—I have.

957. Just give the committee a notion of the area of the Holborn district?—The Holborn district commences at or about Queen's-square, in Bloomsbury, on the west; and terminates at Old-street, St. Luke's, on the east; it commences at Chancery-lane, on the south; and terminates half way down the Gray's Inn-road, on the north; it is about one mile and a half long by half a mile wide.

958. The thoroughfares of Holborn are very much used, are they not?—Yes,

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I consider the thoroughfare of Holborn to be more used for carriage traffic than any other street in London, and the side streets are also very much used for vehicular purposes.

959. Is it 5,332 openings in five years?—Yes, made by five companies.

960. What are the five companies?—The London Gaslight Company, the Imperial Gas Company, the Chartered Gas Company, the City of London Gas Company, and the New River Company.

961. Does the New River Company exclusively supply the district?—There is no other water company than the New River Company, as far as the Holborn district is concerned.

962. What you can tell is the cost of trenching?—I can tell the cost of repairing the trenches after the pipes have been laid. I have a general knowledge only of the cost of laying the mains. I am not concerned in pipe laying; my duty is to see that the pavement is restored after the main is laid. The cost of repaving a road, without concrete foundations, is 1*s.* per yard superficial. It is not at all unusual to have to relay the trenches three times, so that the cost would be 3*s.* per yard superficial upon all the pavement disturbed in the roadway, without concrete foundations. Where concrete is employed, it is not necessary to repave the trench so frequently; twice is found sufficient; however, the cost becomes greater, on account of the foundation, which is an expensive one, and 3*s.* per yard superficial is charged in that case. The trench being paved twice would represent a total charge of 6*s.* per yard superficial.

963. Does the parish pay it and recoup itself from the gas companies?—The gas companies pay the expense. The amounts are very considerable; sometimes, hundreds per year. The New River Company will have to pay us upwards of 1,000 *l.* for work done for them for the last half-year.

964. Have you any actual return made of what the companies have paid you, during the last five years, for work done in your district?—I have no return, but I can speak from memory, that in five years, the amount received from public companies, in my district, has been from 3,000 *l.* to 4,000 *l.*

965. That is from five companies in five years?—Yes.

966. That has nothing to do with digging the trenches?—Nothing at all. The amount paid does not at all cover the amount of mischief done to the pavement. The consequence of opening a trench in the public pavement is, that the roadway is never got back again to its original state.

967. *Chairman.*] There is the expense of opening the trench?—Which I should think would be three times as much.

968. Mr. *Phinn.*] You have spoken of the number of applications for openings; I suppose that entails a good deal of machinery and office work, does it not?—Yes, it involves a large amount of labour in my department.

969. Which the company do not pay, but the parish have to provide the clerks and people necessary?—The inspectors and all the staff are paid by my district Board.

970. There is a good deal of red tape, I suppose, about it?—We make as little of it as possible, but of course there is some amount.

971. Do you find that you can bring the gas and water companies to concur in rendering only one opening necessary?—No, we have very great reason to complain of their not falling in with our arrangements with regard to the pavement. I should wish to state that in the year 1861 the Gray's Inn-road was repaved from end to end, at a cost of 14,000 *l.*, and at this moment the New River Company are driving two trenches from end to end, and, I venture to say, are completely spoiling the pavement.

972. Before you commenced the work did you invite the gas and water companies to make an arrangement so as not to disturb it after it was completed?—A communication was sent by my Board, asking the gas and water companies to take advantage of it, in order to do any works that might be necessary.

973. Will you just read the terms of the communication?—I have not got the letter here; it is a simple letter which I wrote to the engineers, informing them that on such a day a certain street would be repaved, and hoping that they would take advantage of the fact to do anything that might be necessary to their pipes and mains.

974. Did you do that with reference to the Gray's Inn-road?—I did.

975. Did you get any answer from them?—I got no answer in that instance at all. It became my duty to report to the Board the fact of the breaking up the pavement,

pavement, upon which they directed their clerk to write a strong letter of remonstrance to the New River Company. I have a copy of the letter that was sent to them, which I can read. It is dated 5th February 1864, and is signed "S. W. Hopwood, clerk," addressed to the secretary of the New River Company. "The Board of Works for the Holborn District have heard with great regret from their surveyor that he has received an intimation of the intention of the New River Company to take up the carriage way pavement in Gray's Inn-road, for some purpose connected with their works. The District Board are compelled to remonstrate with the company on the vexatious expense and annoyance caused by the company's operations in this district. In the year 1862, the District Board, at great pains and expense, repaved with new stone, and on concrete, the carriage way in Chancery-lane; within about 12 months afterwards the company entered upon it, took up its entire length, and they are now dealing with the carriage way of Holborn in a similar manner. So recently as 1861, not only that portion of Gray's Inn-road with this district, but the whole of it from Holborn to King's Cross, was at great cost relaid with new stone, on a concrete foundation, and now it is proposed by the New River Company to take it up from end to end. Before any of those streets were repaved, notices were given on behalf of this Board to the New River Company, inviting them to take advantage of the opportunity which then presented itself of executing such works as they deemed proper; and it really does appear to the Board that the company can hardly justify the unreasonable damage they inflict upon the pavements, and the inconvenience the public are subjected to by their course of proceeding."

976. Did you get any answer from them?—I got this letter, dated 13th February 1864, signed "Alexander Inglis, the Secretary of the New River Company. It says: "Sir,—I am instructed to express the New River Company's regret that their new works should have occasioned so much inconvenience as that complained of in your letter of the 5th instant; they also desire to assure your Board that the works they have thus undertaken at great expense have only for their object an improved supply of water to the consumers, more especially to the inhabitants of the Holborn district, and that all damage done to the paving in the course of the work will be made good at the Company's own cost."

977. They might as well have done it in 1861 as in 1864?—That is our view. We say that the Holborn district is entirely populated and covered with houses, and that the requirements of the Company in that neighbourhood so well known, that they might just as well have laid down these pipes in 1861 as in 1863.

978. Now, with regard to Chancery-lane, you said something occurred?—That pavement was taken up within twelve months of its being put down.

979. And I suppose the whole of the road is much disturbed by being made weaker in one part than in another?—Yes, the paving is very uneven.

980. With regard to the present system, you have from time to time had explosions?—Yes.

981. Are you cognisant of that which took place in 1862?—Yes.

982. Which was the company?—The company was the London Gaslight Company. They were laying a main in Holborn, and for the convenience of their customers charged it as they proceeded. At the time the works were in hand the New River Company were also executing some work, and accidentally a bladder used in stopping the main got disturbed, and allowed an escape of gas, which, mixing with the atmospheric air, caused the explosion; a plumber at work for the New River Company was using his fire for making a joint, and that fired the compound. By that explosion two men were killed, and two others were seriously injured.

983. You say the cause of the explosion was removing the bladder?—Yes.

984. Having run the bladder through two holes of the pipe, it expanded by air?—Yes.

985. They had not done that properly?—They had done that properly, but the neck of the bladder got displaced. I believe a Volunteer band passed up the street just at the time, and the public made a rush to hear the band, and in going over the trench they disturbed the bladder. It was purely accidental.

986. At any rate we should not have the volunteers in a subway?—No; this accident could not have occurred in a subway.

987. You have had experience of the operations of gas and water companies; in the first place, do you think subways themselves would be a good thing?—I do;

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do; I certainly think, having regard to the convenience of the public in the first instance, and the interests of the companies in the second, that it would be very desirable.

988. Do you think it would be of any use having a subway unless you made all the companies come into it?—It would be absurd to make a subway unless the companies used it.

Cross-examined by Mr. *Burke.*

989. You gave us a return of 5,000 openings in five years?—Yes.

990. That would be at the rate of 1,000 a year for five companies?—Yes.

991. You have given in the return that in those five years you have received 4,000 *l.*?—That would be about the amount.

992. So that that yielded less than 1 *l.* for each opening?—Yes.

993. You would not represent those openings as very serious which cost only 1 *l.* each?—I do not say that the whole 5,000 openings were serious.

994. The bulk of the openings would be for laying service?—The greater portion of them would be.

995. The cost to the five companies would be 1,000 *l.*, so that it would be 200 *l.* a year each?—That would be the proportion.

996. Can you give me anything like the number of miles of pipes in your district?—I cannot give you the mileage of the pipes.

997. Can you give me anything like the mileage of your streets?—We have 20 miles of streets.

998. And was it in the area of those 20 miles of streets that they paid 200 *l.* a year each?—Yes.

999. If it cost them 200 *l.* a year each for 20 miles of streets, what would you imagine would be the sum that they would have to pay, so as to pay four per cent. on the subways on 20 miles of streets?—I cannot give you that, because the amount is not ascertained.

1000. Let us take the minimum given us by Mr. Bazalgette, which, I think, is 3 *l.* per foot; how many feet are there in a mile?—Five thousand two hundred and eighty feet.

1001. Then you would have 15,000 *l.*, or upwards, per mile?—Yes.

1002. And that multiplied by 20 would give us how much?—That would give 300,000 *l.*

1003. So that to pay four per cent. on 300,000 *l.* you would have 12,000 *l.* a year to pay instead of what these companies have paid, 1,000 *l.*?—Yes, that would be so, if the whole of the streets and places in my district were provided with subways; but it is simply absurd to suppose that this would ever be done.

1004. You are unable to give us any figures; but here is the fact that, taking the best view which Mr. Bazalgette can give us, the minimum of 3 *l.* will cost 300,000 *l.*, for which you will have to get 12,000 *l.* a year. You stated that these companies have paid 200 *l.* a year each?—Yes.

1005. You have no notion of the cost of laying mains?—No.

1006. Then you cannot give us any notion of the cost which the companies have been put to in laying their existing mains, and the cost they would be put to in removing their mains, in addition to the 12,000 *l.* a year which you propose to tax them?—No.

1007. You say already, for instance, that they paid you originally upwards of 1 *s.* a square yard for merely raising your pavement?—Yes.

1008. Then they have got trenches to make in addition to that?—Yes.

1009. Then they would have to replace the old pipes by new, to go into these subways?—I should think it would be desirable, if the old pipes were much worn, to put new ones down.

1010. As an officer of this Board of Works, do you think it fair and reasonable that they should come with a calculation of the expense before they impose a tax upon other parties?—I do not know that it is our duty to be prepared with a return of the cost.

1011. Do you think it a reasonable proposition that a public body should come forward without having made any calculation of the expense whatsoever that they are putting the existing companies to, and yet compel them to incur that expense without knowing what it is, and impose upon them an additional tax of four per cent. upon their outlay?—I think the difficulty rests, in a great measure, with the gas and water companies, because the cost of their mains is only known to themselves; that is information which they will not supply to us.

1012. You,

1012. You, or any gentlemen on your side, are not prepared to give us any notion of the expense you propose to throw upon the companies?—We could not possibly give returns of that, because the cost is now only known to yourselves.

1013. You think it fair to put upon us an indefinite expense?—I do not think it would be so.

1014. You seem to entertain the opinion, in favour of subways, that the companies ought to be forced to use them; do you think there has been any sufficient experience of working the subways in London to adopt such a Bill as this, compelling all companies to use them?—I think the experience, up to the present time, is certainly somewhat limited.

1015. Do you not think that it would be fair to wait and see the effect of the subway along the Thames Embankment before you establish this new rule all over London?—I think it is a fair inference, from the trials which have already taken place, that subways can be used for laying down gas and water mains.

1016. You think that the experiments have gone far enough to lay down the principle that a subway for gas and water pipes is a practicable thing, and that the mode you propose is fair?—Yes.

1017. Although you have not a single figure to give us as to the cost?—No.

1018. Do you know anything about the details of this explosion which took place in Holborn?—Yes.

1019. You have stated what was the cause; do you know why the bladder was removed; were you there at the time?—I had left the place about five minutes before the explosion took place; I was not present, or I should not have been here, in all probability, to tell the tale.

1020. You think it was from the simple accident of the removal of the bladder that the explosion took place in an open trench?—Yes.

1021. I suppose you will tell us that an explosion in an open trench would be necessarily less serious than an explosion in a confined place?—I think that with an explosion in a subway there is far less chance of injury to life or limb than in an open street.

1022. You are of opinion that an explosion in this room, which might perhaps destroy the whole building, would be less dangerous than an explosion which took place in the River Thames?—It would depend upon the character of the explosion.

1023. I am taking the case of a tunnel passing between two rows of houses, and that tunnel being blown up in proximity to the foundations of the houses; do you mean to say that that would be less dangerous than an explosion in the open air?—I think, as regards the explosion taking place in a subway, and one taking place in the open air, supposing that in the open air it took place in a crowded thoroughfare, that the explosion in the subway would be less dangerous,

1024. Now, with reference to these alterations by the New River Company, what was the object of them?—It was stated by them to give an improved water supply.

1025. Although the company may not have required in 1861 to have that improved water supply, yet in 1864 they did?—In the Holborn district we think the facts in 1861 were quite as sufficient to enable them to determine upon giving an improved water supply as they were in 1863.

1026. Do you not think that the other parties were interested in consulting economy for their own sake?—I think so.

1027. Do you think that the Company would incur the expense of breaking up the streets after they have been laid down, and having to lay them down again, then take advantage of your alterations to lay them down?—That might be so.

1028. Do you think that they voluntarily incurred this expense?—I think it occurred in this way. In 1861 the engineer of the New River Company had not included in his estimates the cost of laying down these mains, so that when the opportunity arose there was no provision for it; in 1863 he did it, totally regardless of the public convenience.

1029. Do you know that in 1861 the Company had felt a necessity for laying down new mains?—No; I do not know. The district of Holborn is well covered with houses; had it been in the suburbs, one could imagine that such a case might

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might arise; it would occur rather in a part of the country which is sparsely covered, than in one which is covered with buildings.

1030. Do you know whether this main extends further than Holborn, or to other districts beyond Holborn?—The New River Company say it is for the supply of the Holborn district.

Cross-examined by Mr. *Toulmin Smith.*

1031. Has not the Board of Works itself made the greatest obstructions which have been made for many years in Holborn; is it not at this time obstructing Holborn?—The Main Drainage Works have not interrupted Holborn to a large extent.

1032. Not during the last six months?—No.

1033. Do you not suppose that anybody who has ever gone through Holborn has not been obstructed by the operations of the Board of Works in connection with the drainage?—They have opened shafts, but the traffic has not been entirely stopped as it was by the New River Company's operations.

1034. Do you wish to see another case of obstruction by a subway?—Yes, I should be very glad to have a subway in Holborn.

1035. Did you give notice to the Board of Works of your intention of repaving Holborn?—No; we have not repaved Holborn since 1857, but we shall have to repave it very soon.

1036. In consequence of the works done by the Board of Works?—No; in consequence of the works done by the New River Company.

Cross-examined by Mr. *Bruce.*

1037. May I call your attention to section 111 of the Metropolis Local Management Act—(*The learned Counsel read the Section*)?—Yes.

1038. Therefore, the pavement is to be put in exactly the same condition as it was when the Company broke it up?—As nearly the same as practicable. We cannot get it the same.

Re-examined by Mr. *Phinn.*

1039. You may pass Acts of Parliament, but you cannot make people comply with them. With regard to Holborn, have you not had the pneumatic despatch along there?—Yes.

1040. They have broken it up pretty much?—Yes, they have created a very serious obstruction.

1041. You would be very glad to see them forced into a subway?—Yes; it would be for the convenience of the public generally if the whole of the companies, including the pneumatic despatch, used the subway.

1042. My learned friend has taken your 20 miles of streets, and then multiplied that by 15,000. You do not contemplate subways in your parish?—It is utterly absurd to have a subway, except in such leading thoroughfares as Holborn.

1043. There is no proposal before Parliament to have subways for your parish?—No.

[The Witness withdrew.

[Adjourned till To-morrow, at Twelve o'clock.

Martis, 10° *die Maii*, 1863.

MEMBERS PRESENT:

Mr. Du Pré.
Mr. Floyer.
Viscount Grey de Wilton.
Sir Baldwin Leighton.
Mr. F. S. Powell.

SIR BALDWIN LEIGHTON, BART., IN THE CHAIR.

The Committee-room was cleared.

After some time the Counsel and parties were again called in.

The *Chairman* stated that the present impression of the Committee was that subways with compulsory powers would be advantageous, and that the chief question was as to the expense and the danger of explosion; and that the Committee wished to know whether the Metropolitan Board of Works would bind themselves by a clause to increase the size of any existing or future subway, whenever more space was required for the accommodation of the pipes; and that the Committee wished also to know whether the operation of the Bill would be to deprive the gas and water companies of a *locus standi* against any future Bill for a subway.

Mr. *Toulmin Smith* stated that the Bill as it stood would deprive the companies of such a *locus standi*.

Mr. *Phinn* stated that the promoters did not consider that such would be the operation of the Bill, but that they were willing to insert a clause to reserve the *locus standi* against future Bills for subways. He stated that he would give an answer to-morrow to the inquiry of the Committee with respect to the enlargement of the subways if necessary.

George Willoughby Hemans, Esq., sworn; Examined by Mr. *Johnson*.

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1044. AS we all know in these rooms, you are a civil engineer, and have been extensively engaged in various public works, many of them of some magnitude, for 25 years past?—Yes.

1045. I believe you have, in company with Mr. Bramwell, visited Paris, have you not, for the purpose of examining into the question of subways generally?—Yes.

1046. Especially as connected with the gas and water mains?—Yes.

1047. And generally with public objects, the telegraph wires, and so forth?—Yes.

1048. You know, of course, what the proposal is under the present Bill of the Metropolitan Board of Works?—I do.

1049. You are aware, no doubt, that many of my learned friends, representing water and gas companies, are here in opposition to that Bill?—Yes.

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1050. Have you made yourself acquainted, also, with the various grounds of opposition which they put forward as objections?—I have.

1051. Let us take a few of them *seriatim*; do you know that they complain of the enormous expense which they say will be entailed upon them in altering the mains and putting them in the subways?—Yes.

1052. And that they are not, in fact, in possession of funds to meet such an outlay?—Yes.

1053. In your judgment is that a well-grounded objection, or in your judgment will it be a matter of economy rather than additional expense?—I am unable to see how any expense arises of a character which is unusual in the present condition of things. The subways that the pipes are to be laid down in are confined at present entirely to new streets. Those streets will have houses which must of course have supplies of water and gas, and I cannot see that there is more expense; on the contrary, I think there is less expense in laying them at the beginning in a subway than there would be in trenches.

1054. You know, of course, that the extension of these subways into new streets as they may be formed, will be very gradual and progressive?—The whole of the subways at present are less than three quarters of a mile in length, so that the distance of pipes to be laid by companies who have already some thousands of miles is really very trifling indeed; and looking at the enormous expense of constructing new streets, and buying the property for the purpose in London, it seems to me that the utmost extension that could be calculated for these subways would be certainly under a mile per annum, if it is anything like so much. It seems to me improbable that even that length of new streets could be constructed, considering the enormous expense that they cost, and the difficulty of getting them passed.

1055. The enormous expense of subways, supposing that they are desirable things in themselves, would be to a very great extent extravagant and useless, if the companies were to have the option of determining whether they should come into the subways when formed, or not?—I think it would have been most improper to have gone to the expense of making these subways, and to have built new streets, and paved them in the superior manner in which they are now done, if the companies were to be allowed to retain their present power of ripping up that pavement immediately, and destroying what had only just been finished.

1056. I do not know whether you are prepared at all with any statement of the comparative cost that one system would involve as compared with the other; the system of breaking up the streets constantly, and laying the mains and pipes in the trenches, on the one hand, and the cost of making subways into which those pipes and mains should be carried, on the other hand?—I shall not pretend to give exactly the cost, but I have an estimate here, which, from my knowledge of the work, and from having had pipes laid under my directions, I know cannot be far from the mark.

1057. You do not present it as a detailed estimate at all, but as an approximate estimate, in your mind, of the cost of the one as compared with the cost of the other?—Yes; I must say, in the first place, that the difference of cost between laying in a subway a single line of pipes and laying them outside will not be very considerable, in my opinion. At present, there is no experience of the actual cost of laying them in the subway; but when you put together the cost of first laying them in the streets, and the expense of afterwards opening the ground for repairs, there would be a very great saving in that. I can give the Committee the estimates; I estimate that the laying of a 12-inch pipe will cost about 198 *l.* to 200 *l.* per mile.

1058. That is for the laying?—Yes, that is for the laying; it is the labour; what is called trenching; a 12-inch pipe would cost, you may say, 200 *l.* a mile.

1059. *Chairman.*] Upon the present system, you mean?—Yes; upon the present system a 24-inch pipe would cost 438 *l.*, and a 36-inch pipe would cost 770 *l.*

1060. Does that include the pipe itself?—No, by no means; it is merely the labour of trenching. You must recollect that a 36-inch pipe is of very large dimensions, and requires a great deal of labour in taking up and putting down.

1061. Mr.

1061. Mr. *Powell.*] Does your estimate include the expense of labour in taking up the streets and putting them down again?—Yes; all that goes under the name of trenching. This is for one company only. If four or five companies require to lay down pipes along the streets, it would be multiplied according to the number of companies.

1062. Mr. *Johnson.*] The expense is multiplied in proportion to the diameter of the pipe, is it not?—Yes.

1063. *Chairman.*] Do you mean to say that if four companies laid down 36-inch pipes in a new street the cost would be four times 770*l.*?—I am supposing that the street is paved, and that it requires to be opened at different times by different companies.

1064. Mr. *Johnson.*] If you were laying pipes in a new street, and knew the exact requirements of all the companies, of course that could be done more economically than when each company has to lay their own, and disturb the surface every time?—Yes; but I apprehend that the laying of pipes upon the surface of a new street before the pavement was laid would hardly be done. There is the new street at Southwark: there are no houses at all, at present, there, and there are no mains laid; in fact, it is not likely that all the companies that may hereafter have to lay their mains there would lay them there to lie idle before the houses are built. Therefore, I think it is fair to take it that each company would have to open the pavement and lay the pipes when they are required.

1065. Then, according to your view, as they provide those necessaries as the houses are inhabited in a street, there would not be a great diminution of the expense in a new street as compared with an old one?—No.

1066. The same practice would prevail, would it not?—Yes.

1067. Of course, the average cost per annum is more within the Companies' knowledge, because it is their own expense; have you any means of telling me what, in your judgment, is a fair approximation to the expense to them of disturbing the ground and relaying it?—I have no means of giving an accurate opinion, but the continual opening of the pavements is evidently a source of very great expense.

1068. *Chairman.*] You have no accurate knowledge, you say, upon that point?—No.

1069. Mr. *Johnson.*] I understood you to say that, in your judgment, in the process of time at all events, the adoption of subways must be a source of economy rather than the contrary?—Yes, decidedly; I think it must.

1070. You heard my learned friend, Mr. Burke's, cross-examination, I dare say, as to multiplying the streets and subways by the number of miles of pipe which the companies have laid down; you tell me you contemplate the extension of the subways being only gradual and progressive?—Yes.

1071. With regard to old streets, to what extent will these powers be adopted or enforced in the case of old streets?—With regard to old streets there is no power to put subways in them, and therefore the question of compelling the pipes to be changed from their present position into subways, does not arise at all.

1072. Let us now go to another head. They allege also that the opening of the streets, to remove these pipes into the subways, would be an annoyance to the public; would there be any difficulty, by means of the side entrances that are made into these subways, in taking pipes of any diameter that might be required in the subways for the passage either of water or gas?—The question will hardly arise, as there really are in the new streets no pipes to take up and remove, but there is plenty of room in the openings for getting into the side galleries to take in any pipes except the very largest. I think for a three foot pipe, which is the very largest, the opening might require to be enlarged for the period of the operation, but that would be a very simple thing; all the others could be taken in without difficulty.

1073. We have all had the advantage of seeing these openings; if there were a pipe of larger diameter than could go down at present through the side entrances, when required you might make a larger side entrance, might you not?—Yes; you might make a temporary opening, or a slit, by which the pipes could be carried down.

1074. Can you tell me what diameter of pipe the present openings would take,

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without alteration?—The galleries are 3 ft. 9 in. in height, and I think about the same width.

1075. I speak of the larger pipes for the mains; you speak of the side galleries for the service pipes?—The pipes would enter by the cross galleries, either by the passages or by some of the cross galleries; the entrance passages are high enough to walk in.

1076. Would you distinguish between the side galleries which are for two houses each, and rather, as I understand, for the purpose of the lateral service pipes, and the side entrances, which are for the descent of the workmen and for carrying down the materials?—Yes; the side entrances, with an enlargement of the opening perhaps in some cases would be enough to take in any pipes that are laid.

The *Chairman* stated that unless something arose upon cross-examination, it would not be necessary to go further into that point.

1077. Mr. *Johnson*.] As regards the present size of the subways, are they in your judgment, adequate for the transit along the subways themselves after the pipes shall have been taken down into them?—I cannot see why they should not be so, for this reason; although there are objections to burying gas pipes, still, if these subways proved at all tight, or if a large accumulation of pipes was required in one of them, I see no objection to burying the water pipes. I think the water pipes might be buried, as the companies have done in the Covent Garden subway; they might be partially or wholly sunk below the surface, and all the remainder would be left for gas, and would accommodate an immense number of gas pipes.

1078. That would leave room also for the passage of other pipes, either for repair or replacement, would it not?—It would leave plenty of room.

1079. It has been also stated, as an objection, that the pipes and mains in the subways must be of a very complicated and costly character: is that your view?—There is no sort of complication needed about them, but at the entrance and exit the pipe requires to be made in one or two places in an S form; there is no sort of difficulty about that; it is a kind of casting that can be done with the greatest facility; that is nothing at all to the complicated castings that are made every day.

1080. In point of fact, there is nothing to require a more complicated construction in these subterranean passages than when the pipes are laid in the ground?—No, I cannot understand the objection.

1081. Another thing that they allege is, that the pipes would be corroded and deteriorated; is that well grounded, in your judgment?—In that respect the pipes would be infinitely less liable to corrosion than when buried in the ground; if they were above the surface they would be capable of continual painting and watching; I do not see how they should corrode at all; I do not think they would.

1082. If they were raised upon bearings, of course there would be a facility of painting them from time to time?—Yes, raising them a moderate height, so as to get a paint brush or a tar brush underneath I think would be advisable, and a very great protection to the iron.

1083. With respect to another objection, do you apprehend any injury to the pipes from vibration, if they are properly placed in the subway?—The whole of the vibration of heavy vehicles passing will be borne by the arches of the subway and the galleries, and the pipes will be entirely free; they will be very much less liable to vibration than they are now. The arch will protect them, and take the shock of passing vehicles. The pipes will in no way partake of that shock, except so far as it is communicated through the foundations, which will be to a very trifling extent, compared to the position they are in now, where they are directly subject to the impact of all the heavy vehicles that go over.

1084. Of course the bearing of those pipes will be from below, and not by any suspending process from above?—I should not recommend any attachment to the arch at all, so as to avoid vibration. I think they should be laid either upon the ground or upon blocks of brick, which would be the cheapest thing to do, or laid upon cast-iron supports.

1085. In fact, do you attribute many breakages and leakages in the pipes as they are now laid, to the fact of vibration, from the superincumbent weights passing

passing over them?—There can be no doubt that the shocks and vibrations, and knocking about of the pipes above, must be a cause of frequent breakages and leakages.

1086. Another point, and perhaps the main one, that they have made, is with regard to the danger of explosions; I believe you had occasion, when in Paris, very carefully to inquire into and ascertain the causes of explosions which had been represented to have taken place there?—Yes; I was sent to Paris for the express purpose of making inquiry into the alleged explosions: I put myself into communication with the chief engineer of the municipality, M. Belgrand, and ascertained his views upon the subject; I asked for orders to be allowed to examine the localities. M. Belgrand put us in communication with M. Gallait, who was under him, and I found that this M. Belgrand had a very strong impression, from information that he had received, that gas ought not to be put in subways. He had been informed that a gas pipe that had been put in a subway, or, rather, in a sewer, in Paris, in the Place du Carousel, had caused an explosion in a sewer immediately adjoining, and from that circumstance, and from another explosion that he had heard of in a sewer also, in the Place Roubaix, in Paris, he had come to the conclusion that it was highly dangerous and improper to put gas pipes in a subway, and, consequently, they have not done it in the new Boulevard de Sébastopol. However, in order to go into the question, Mr. Bramwell and I, accompanied by a body of workmen, sent for the express purpose, went to examine the subway in which the gas pipe was laid, and the scenes of those explosions, and we found that M. Belgrand had been entirely misinformed, and that no explosion whatever had occurred in the vicinity of the gas pipe which is laid in the subways; he was totally misinformed, also, as to the explosion in the Place Roubaix having anything whatever to do with the pipe in the subways. We discovered that they were both at a considerable distance.

1087. Mr. *Powell.*] Do you mean to say that neither explosion arose from the gas?—The chief engineer of Paris had been informed that the gas pipe which had been laid in the subway had caused the explosion in its immediate vicinity, and he directed a number of workmen and assistants to go to show Mr. Bramwell and me the place. I have brought here a map of Paris to illustrate it; we took very great pains to trace out the two explosions which had occurred, and after a good deal of trouble we found out exactly where they had occurred. I have here a map of Paris (*producing the same*) showing the position of the gas-pipe that is laid in the subway, or rather the sewer, and also the scenes of the explosions; anyone can see from that that the explosions could have had nothing to do with the pipe in the subway, and therefore Mr. Bramwell and I came to the conclusion that the engineer had judged from misinformation.

1088. Viscount *Grey de Wilton.*] Did the explosion take place in the subway?—No; at a great distance; more than half a mile from it; here (*pointing to the map*) is the Place du Carousel; the gas-pipes were laid by the Imperial engineer all round the Place du Carousel, and the first explosion we traced is in a sewer which has no connexion with that in the Rue du Marché St. Honoré; the subway in which the gas is, runs all round there; it is called the Place Napoléon III.; I do not know how far it goes from that; how far it goes beyond, I am not able to say.

1089. Mr. *Powell.*] Is that a subway in the Place du Carousel?—It is not really a subway; it is a dry sewer.

1090. Viscount *Grey de Wilton.*] It is one of the subways we have heard of, is it not?—It is not the main subway; the main subway runs along the Boulevarde de Sébastopol; it is a sewer which seems to have no water in it; it was quite dry when we entered it. They seem to have taken advantage of it to avoid breaking up the pavement, to lay gas and water pipes for the supply of the Louvre. The explosion was more than half a mile from that place.

1091. *Chairman.*] There is no subway where the explosion took place whatever, is there?—There is no subway there whatever. We traced the whole history of it; it occurred from workmen repairing a service pipe going to a shop close by. The earth round the pipe had become impregnated with gas, and the workmen threw all that earth upon the top of an opening into the sewer below; the earth was impregnated with gas, and some seems to have got into the funnel. The sewer has a funnel like that upon the map, and the earth impregnated with

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gas stopping over it prevented ventilation, and gas from the leakage of a pipe that had been going on for some time accumulated in one of the passages; then the workmen below, who had nothing to do with the gas at all, came by with lights, and that caused the explosion. There was no great injury done; some workmen were scorched.

1092. Viscount *Grey de Wilton.*] How far from the surface did the explosion take place?—The hole in which the explosion took place was like that (*pointing to the map*); it is a funnel which ends in a hole upon the surface. The other explosion was in the Place Roubaix, a mile and a half off.

1093. *Chairman.*] It had nothing to do with any subway?—That occurred, again, in a sewer; not a subway. It seems that a very old leaky pipe had discharged its gas into the sewer, and a light passing by, caused it to explode.

1094. Viscount *Grey de Wilton.*] It was evidently the belief of the chief engineer that the explosions had taken place in the subway, or close to it. You say that it was half a mile off?—Yes.

1095. *Chairman.*] With regard to the second explosion, that was in a sewer, was it not?—They were both in sewers; we did not trace, in detail, the second explosion. When we found it, it was a mile and a half off; we thought it was not worth while going into the details of it.

1096. Viscount *Grey de Wilton.*] The engineers founded their experience of gas in subways upon those two explosions?—Entirely upon that. Those were the only objections that Mr. Belgrand gave to us for objecting to gas in subways; it was on account of what he had been informed in that respect.

1097. Mr. *Johnson.*] Those were the only two explosions which had been brought to their notice; and, having investigated them to the fullest extent, you found no ground for saying that either of them originated in a subway?—Just so.

1098. Let me ask generally, was there anything, after your inspection and investigation into this whole matter of the Parisian experience, if I may so call it, at all to induce you to have any misgiving as to the propriety of putting the gas, as well as the water pipes, into the subways?—I and my fellow traveller, Mr. Bramwell, thought that the experience was rather the contrary; that it was rather in favour of gas being put into subways.

1099. I do not know whether you told us that there were actual gas pipes within some of the subways in Paris?—There are.

1100. Were they in operation or not, do you know, because the pipes might be there, and yet the gas might not be laid on?—We were told so, and we had the engineer in charge of those pipes, who told us that the pipes had been in use nine years in that subway, without any difficulty or danger arising; and that they lighted the street lamps, and were in use. We did not light the gas anywhere, because we thought it unnecessary, having the man in charge with us.

1101. The sewer you were speaking of just now was a mere surface water sewer, was it not; it did not carry the general refuse of Paris in it, did it?—The sewer in the Boulevarde de Sébastopol carries a portion of the drainage of Paris, and is converted afterwards into a main collecting sewer, but the sewer in which the gas and water pipes lie is quite dry; there is nothing in it at all.

1102. That was probably in consequence of the dryness of the weather?—It appeared rarely to have much water in it; it might have been in consequence of the dryness of the weather.

1103. Were those sewers, so to speak, ventilated or not?—The sewer in which the gas pipe lies is very well ventilated.

1104. And where the explosion took place, was it a ventilated sewer or not?—There was no ventilation possible at the moment, in consequence of the earth which had been excavated having been thrown over the venthole.

1105. That was the cause of the explosion, as I understand?—No doubt it was the cause of the explosion.

1106. There is another allegation in these petitions, that the construction of these subways is wrong in principle, for this reason, that they prevent future streets being made, except they are brought perhaps transverse to the streets, with the subways laid in them; is there any force in that objection?—I cannot understand the objection at all; there is nothing in the world to prevent the street at the end of one of those new streets, represented by that crossing there having also a subway at right angles to this one, and opening at right angles just

just as this one does; nor do I see why a subway should obstruct anything, except perhaps the Pneumatic Railway, or an underground railway; they are things that could never be provided for by any other arrangement of subway, unless the whole street were left as a subway; a subterranean railway would require a depth of 20 feet; that would absorb not only the subway, but the sewers themselves; for that, a special arrangement would have to be made.

1107. Like all the metropolitan railways, of course it disturbs, unless it goes over them, all the water and gas pipes throughout the length of the line?—I think it would be utterly impossible to carry out any street or system of subways for the possible contingency of a subterranean railway; each subterranean railway must have an arrangement for its own purpose.

1108. I understand the question to go generally to the formation of streets, with cross pipes and mains running transversely, perhaps to the angle of any streets that had been formed; would there be any difficulty in the adaptation of the subway, supposing that took place?—No; in the first place there would be no difficulty in adapting it if a cross-street were required; but it is very unlikely that these fine new streets, having been laid out at great expense, any other streets will be required within a reasonable time which would involve any taking up of the subway, or any alteration of it extensively.

1109. As regards another objection; the leakage of the gas mains if laid down, and the insecurity of repairing them underneath in the subway, and the use of artificial light for that purpose; will you bring your mind for a moment to that objection upon the part of the gas companies?—With regard to leakage, it is notorious that the leakage of gas now is excessive. I believe it is also notorious that there can be no doubt that the work is done, in a great many instances, in the most careless manner; in fact, I have seen myself, within the last few days, a service pipe put into a gas pipe in a manner which I think ought never to be permitted, by bursting a hole through it by violent blows with a chisel, instead of doing it in a mechanical and scientific way; there must be a very great deal of escape when that rude system is pursued no doubt. If the gas pipes are laid in those subways they will be constantly liable to careful inspection; they must be laid in a much more perfect manner, and it is much better that, if the gas does escape, it should be found out immediately, than that it should bury itself in the earth and not be detected. If it does escape in the subway it will be detected, and a little paint, or a coating, will at once cure the evil. No doubt the leakage in the subways could be reduced to a minimum.

1110. In fact, the leakage could be reduced to a minimum in the subways, when it could not be reduced to a minimum in trenches laid underground?—I think, on account of the shocks which the pipes are exposed to from the constant change upon the surface, the frost and heat and so forth, they incur greater chances of leakage there than in the subways.

1111. It is more difficult to find out where a leakage is, is it not?—It is almost impossible to find out the exact point; in fact, it is almost general along the joints; it appears to be so.

1112. The streets not being disturbed, and the subways being accessible to the workmen, is it not likely that they may be more careful in completing their repairs than they would be if they were hindered, and if the public were incommoded by the traffic being stopped?—The subways can be inspected at regular periods, whereas the pipes in the streets cannot.

1113. Supposing these leakages reduced to a minimum, these leakages would still arise and reparation must take place; in that case, do you apprehend any danger by the workmen descending in the subways for the purpose of effecting those repairs?—The subways that I have been in, have been so well ventilated, and appeared to be so free from any bad smell or closeness of air, that I apprehend there would be ventilation enough to avoid all danger.

1114. That would carry off any escape of gas that might arise, though you say that it would be reduced to a minimum by the pipes being laid in the subways?—Yes; if gas did, by some accident, escape, it would be detected; the men would smell it, and, in that case, it would be very easy to use a safety lamp in making the inspection. I have seen a safety lamp, giving a very brilliant light, used by a gas company; there would be no difficulty at all in using it in the subway; it gives a very powerful light; I cannot see why it should not be used.

1115. I suppose artificial means might be used of increasing the ventilation,

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or the number of ventilators might even be increased?—The ventilators might be permanently increased, or, in case it were necessary, the application of a fan might be used to blow the air through and take away any gas that there might be any apprehensions of.

1116. Of course we all know that water flows down; gas, I believe, invariably rises?—Yes.

1117. Have you, therefore, any theory or preference as to the position of the pipes of gas and water?—The water ought to be below, and the gas above,

1118. If the gas were above, and if the subways were under the influence of, these ventilators, according to your judgment, the leakage which is reduced to a minimum would never be perceptible all?—I think not,

1119. Do you apprehend at all any danger of contamination of the water by placing it in the same subway as the gas?—I entirely agree upon that point with the evidence given by Mr. Carpmael, who showed clearly that, as long as a pipe is full of water, it is impossible for any gas to get in.

1120. You do not, in fact, apprehend any danger whatever from that?—No.

1121. You have examined, have you not, every one of the subways belonging to the Metropolitan Board of Works?—I have, and also those at Nottingham.

1122. I think, after the intimation from the Honourable Chairman, I ought not to go at any length into this matter; but with regard to the dimensions of the subways for all present and prospective purposes, as far as we can see, would they in your judgment be adequate in extent, and would that be true of the side galleries also?—I think if there was any difficulty by the sinking of the water pipes in the earth, and leaving the gas pipes above, you would afford room for a very large number of pipes; I should prefer all the pipes being kept above ground, because of their being painted and kept free from corrosion, but there would be less objection to sink the water pipes than the gas pipes.

1123. With regard to your Nottingham experiences; you have been down to inspect the subways there, have you not?—Yes.

1124. Will you shortly describe them to the Committee?—The Nottingham subways are confined to two new streets, not very long; they are short streets; the subways are well ventilated.

1125. Mr. *Powell.*] How long are they?—About 150 yards, I think, is the total length; they are two short new streets.

1126. *Chairman.*] Both streets?—Yes.

1127. Is each street 150 yards, or is that the total length?—About 450 feet is the total length, I think.

1128. Viscount *Grey de Wilton.*] Are there two separate subways?—Yes, one at right angles to the other; they join together, but the one is at right angles to the other. It is quite long enough as regards showing what the effect of it is; that distance is as good as a mile, in my opinion. I do not see what difference the length makes; the great point is to see whether the subways are sufficiently well ventilated, and whether the laying of the pipes in them is convenient. I do not know that if they had been three times the length it would have altered my opinion; I do not see what difference it would have made if it had been very much longer. There is ample evidence there of the gas pipes being quite safe and convenient within them. I saw the gas engineer, who said that no difficulty whatever had arisen; he was even able, by the light of day from one of the ventilators, to perform some of the operations in putting in a connection. He had an established point fixed under one of the vent-holes, where a good deal of light came down, and at that point he was in the habit, by the light of day, of inserting a stopper and stopping the gas, in order to introduce the service pipes without any lamps at all.

1129. Mr. *Johnson.*] May I take it, generally, that your experience of Nottingham confirms you decidedly in the views you have expressed of its being desirable to form subways, and place the gas and water pipes within them?—Certainly.

1130. Was it then that you saw some invention of Mr. Upward's?—No, I saw that in London.

1131. Will you just describe that?—Mr. Upward will be here: I will, therefore, merely say that it is a machine by which all the small pipes that require to be inserted into the main gas pipes can be put in without causing any leakage during the operation. I saw it at work in two places, and it performed its work most beautifully; there was no escape whatever of gas.

1132. Mr. *Powell*] The pipes being full at the time?—The pipes being full of gas, and heavily charged at the time; there was no escape of gas; there was just an instantaneous escape at the moment of taking out the drill and inserting the service pipe, but it was only an instantaneous escape, and amounts to practically nothing; Mr. Upward, I believe, will describe it himself.

1133. Mr. *Johnson.*] You have had a good deal of practical experience in these matters; you saw the invention actually applied and in operation, and, according to you, as I understand, there was no escape of gas during the operation?—There was no practical escape; I think, by that invention, service pipes might be put into the mains with perfect safety, and even by candle light; but I do not believe that they could be put in safely by the present rude plan which is adopted in London extensively.

1134. The estimate that you gave of the cost of laying the pipes was exclusive of the cost of the pipes and the joints; in fact, it was merely that of the laying?—Entirely; it was the estimate which covers what is commonly called trenching: the laying of the pipes, and replacing the surface.

1135. In fact, everything that is common to the two systems you excluded from your estimate?—Yes.

Cross-examined by Mr. *Richards.*

1136. You went over to Paris, retained professionally by the Board of Works, did you not?—Yes.

1137. You speak of the chief engineer; what was the name of the engineer with whom you found yourself chiefly in connexion at Paris?—M. Gallait.

1138. Do you know the name of M. Belgrand?—He is the chief engineer.

1139. M. Gallait, then, is a subordinate to M. Belgrand, is he?—Yes.

1140. Do you know M. Le Pudré?—No.

1141. The engineer of the Paris Gas Company?—I do not know him.

1142. You speak French fluently, I suppose?—I do, pretty well.

1143. Enough, I suppose, not to require the assistance of an interpreter between you?—Yes.

1144. Was the gentleman you have mentioned the gentleman who informed you of the facts you have told us, with reference to the escape of gas and the explosions?—M. Belgrand, the chief engineer, was the first person I saw who gave me the opinion that I mentioned, and the reasons for his adverse opinion to laying the gas in the subways.

1145. He was opposed to laying the gas in the subways?—He is opposed to it.

1146. M. Belgrand, the engineer in chief, is opposed to laying gas in the subways?—Yes.

1147. Did he give you his reasons for being opposed to it?—Yes; I mentioned them just now.

1148. He feared explosion?—His reason was, that he had been informed that it had been a cause of explosion.

1149. I presume, as he acted upon that, he believed it?—Yes.

1150. He had been informed and believed that it had been the cause of explosion?—Yes, I have just shown that he was misinformed.

1151. He, being the chief engineer of Paris, acts upon that belief now, does he not?—He does.

1152. The fact is, that when subways are constructed, gas is not introduced into them?—It is not.

1153. In how many subways has gas ever been introduced in Paris; one or two?—I know of only the one surrounding the courtyard of the Louvre.

1154. Are you aware that a subway has been very recently constructed in the new Boulevard de Sébastopol?—Yes, I went through it.

1155. You are aware, no doubt, then, that there is no gas laid down there?—I am aware of that.

1156. In fact, there is only one single instance; that is the case you mentioned of the courtyard of the Louvre?—I am not aware that there is any other; that is the only one I know.

1157. You went over to examine, and, I suppose, you would have found out if there had been any other instance?—I think I should have heard of it.

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1158. When was the gas in this subway by the Louvre laid down?—Nine years ago we were told.

1159. None has been laid down?—I believe not.

1160. Who was the gentleman upon whose information you say that you found no ground for saying that either accident originated in a subway. M. Belgrand seems to think that there is some danger. Whose information guided you in forming your belief?—We were accompanied by a party, headed by a man in uniform, whose name I neglected to write down, but who was sent with us to show us about; and upon his information, as to the subway in which the gas lay, and the place where the explosion occurred, I formed my own opinion; he gave me no opinion.

1161. The man in uniform, I suppose, had nothing to do with the gas works; he was not a gas engineer of any sort?—I took him to be a subordinate engineer of the municipality.

1162. I understand that you, upon paying this visit to Paris, formed your opinion that the gas was not the cause of explosion in the subway, and M. Belgrand, although living upon the spot, forms an opposite opinion?—There was no explosion in the subway at all.

1163. The explosion that took place, I mean?—It took place in a sewer a great distance from the subway.

1164. Did it take place in a sewer in which a gas pipe was laid?—No, I think not.

1165. How many days were you in Paris?—Three days, I think.

1166. Viscount *Grey de Wilton.*] Had you an opportunity of mentioning to M. Belgrand the opinion that you had formed?—No, I have not seen him since.

1167. Mr. *Richards.*] You did not communicate to M. Belgrand the fact that you had arrived at a precisely opposite conclusion to his own, did you?—No, I did not.

1168. Can you tell me the name of any French engineer who has expressed an opinion in favour of putting gas in subways?—I cannot. I only saw two engineers, and they were both against it; M. Belgrand, and M. Gallait, his assistant.

1169. You went over for the express purpose of ascertaining whether it was desirable to put gas in subways or not?—Yes; I did not go over to collect opinions only, but to collect the history of the subways and the explosions, as far as I could.

1170. I believe you saw two engineers only, and they were both opposed to it?—I only saw two, the chief engineer and his assistant; they were both opposed to it, for the reasons I have given you.

1171. With reference to the subways, you say that there is no difficulty in the case of transverse streets; do you mean that there would be no difficulty in two sets of pipes crossing in transverse streets?—No.

1172. One street going north and south, and the other east and west, I mean?—There is no difficulty in joining the subway in transverse streets.

1173. With pipes in it?—In the case of the pipes there would have to be a special arrangement made when they came across each other.

1174. They would have to go through one another, would they not?—They would have to go either over or under.

1175. Do you propose to put two sets of pipes in the subways, or only one set of pipes, with service branches coming out right and left all the way down?—That is a matter of detail; that belongs to the gas companies; probably it might be done as they have done it in Covent Garden; they have laid a gas pipe, one on each side.

1176. If you have it in the centre it makes the passage up and down a little awkward, does not it?—I should put it off the centre, I think.

1177. You would not put it in the centre?—No.

1178. Would you have two pipes?—I might or I might not. I think that that is a question which the gas companies would be more able to answer than I; there will be plenty of room for them

1179. You are, of course, aware that if you provide the gas in two pipes you require considerably larger-sized mains than if you have one?—Yes.

1180. Two 9-inch pipes will not carry what one 18-inch main will?—No, of course not.

1181. The

1181. The subways you have seen are remarkably well ventilated, you say?—Yes.

1182. Were you speaking then of subways in England?—Yes, and Paris also.

1183. The subways in England are confined to Southwark, Covent Garden, and Nottingham, are they not?—And Paris, you may say.

1184. I am speaking of England?—There are no others.

1185. In Southwark the houses are not finished, are they?—No.

1186. That absence of houses would rather improve the ventilation, would it not?—To some extent it might.

1187. You speak of the leakage of the gas pipes, and you say that the leakage is now notoriously excessive, and that the work is done in a notoriously careless way. Do you know what the per-centage of leakage is?—I do not. I know that it is very great.

1188. You say it is notoriously excessive; have you no notion what the per-centage is?—I have never measured it; but I have heard that it varies from 10 to 25 per cent.

Cross-examined by Mr. *Toulmin Smith*.

1189. Upon the subject of cost, you have not gone into the detail, you say, of the cost of removing the pipes and relaying them in the subway?—That could only be a supposititious estimate; we have had no experience of that.

1190. There are some things which you can estimate, I presume, as positively as if you had had experience. Will it not be necessary that there should be the same amount of earthwork in taking up the pipes to lay them down in the subway as in laying fresh pipes?

The *Chairman* stated that the Committee did not consider it necessary to have much evidence on this point.

1191. Mr. *Toulmin Smith*.] In taking up the pipes, or their removal, there will be a large amount of earthwork, will there not?—Of course.

1192. Will those pipes that are so taken up for removal be likely to be able to be used again for the same purpose?—I am afraid not; to a great extent they would have to be re-cast.

1193. Then that would be a second expense?—They would be valuable; but I am afraid they could not be relied upon to be used again.

1194. Many of them would be broken at the junctions, I suppose?—No doubt.

1195. Would there not be expensive arrangements necessary to supply gas or water in the mean time?—If such a case arose, it would only occur with regard to subways in old streets, and if that removal were contemplated by the Bill, and had to be carried out, it would be necessary for the company to lay in a considerable stock of totally new pipes to carry on the service while the old ones were being changed.

1196. You have already said that the expense of laying down pipes in the subways would be pretty much the same as in the streets now?—I think it ought to be rather less; not very much less.

1197. You said about the same; then those sources of expense you have just described would be all additional to the expense the companies now have in the exercise of their vocation?—There is no doubt that in the case of removal from one place to another, all those would be additional expenses.

1198. We are not treating now of the case of a town where there are no subways in the whole town, and where new works are being laid down; we are treating of a place more where in scattered places there are single streets which they propose to deal with; does not that make a great difference in the advisability of compelling the companies to use the subways in those single isolated spots?—I think that makes a great difference in favour of compulsory powers, because it puts them to no inconvenience, but only compels them to do in the right way what they would have to do in any case, namely, prepare for the supply for the houses.

1199. Though we call them new streets, they are in reality old parts of the town: for instance, Covent Garden is quite an old part of the town?—I apprehend that that is an entirely new line, and a change from the old service to the

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new service is required for the street. In Southwark there is nothing of the kind, it is a new line of street altogether, and all the new houses that will be built will require new water and gas pipes, and they certainly ought to be put in the right place at the beginning.

1200. In the case of Covent Garden, all round the place where the new street is, there are water pipes laid, and there is a supply going on of gas and water, is there not?—In the adjoining streets there must be.

1201. If the gas and water pipes are compelled to go into the subways, will it not be necessary that the pipes shall be upon different levels from what they are now upon?—Yes, when the subway is entered, the pipe will generally have to be depressed.

1202. Then, the levels will not be, as they now are, carefully arranged as nearly upon the level as they can be made; but there will be places where the air will gather, will there not; they will be syphon shaped?—There will be a curve form at the entrance and exit of every subway, but there will be no difficulty with regard to that, because, at Nottingham, the thing has actually been done; an arrangement has been provided for it, about which you will hear from the engineer; it removes all difficulty.

1203. What is the size of the pipes?—About seven inches at Nottingham.

1204. Are those contrivances for getting rid of the air locks?—Yes, for getting rid of deposits, and getting the pipes clear.

1205. In the prices you have given us under the present system, I do not understand what you include; do you include pipes, labour, and cost of repairing?—I include the cost of opening the trench, taking up the pavement, taking up the earth, throwing it aside, putting in the pipes, and the labour of laying them, and then replacing the pavement.

1206. Not the cost of the pipes?—Of course, not.

1207. Entirely exclusive of the pipes?—Entirely exclusive of the pipes, and entirely exclusive of the lead.

1208. You made that estimate upon the notion that you were dealing with paved roads; you said it was not usual to lay those pipes where the roads were not paved?—I meant it to apply to paved roads.

1209. Are you not aware that in most of the new squares in Belgravia pipes were, as a matter of fact, laid down by the builders before the streets were paved?—I was not aware of it.

1210. Should you be surprised to hear it proved before the Committee that it was done in that case, and that it is a common practice with builders at the present time to have the pipes laid before the streets are paved?—It is quite possible that pipes may be laid down before the streets are paved, when the houses are built first, but I think it is very unlikely that they would be laid down in new streets before the houses were built.

1211. With regard to your estimate, it is for laying down pipes after the streets were paved?—Yes; it is.

1212. You suggested, as one way of increasing the space in the subways, that the water pipes should be buried, the gas pipes alone appearing above ground in the subway; will you explain to the Committee how that would be able to be brought about in the case of repairs becoming necessary, or of a new service, considering that the gas pipes are above the water pipes?—I think that in a very few cases it would be necessary to do that; and I should object to it, except where it became necessary; because I think that all the pipes ought to be exposed, for the purpose of being painted, to secure durability. Where it was necessary, the water pipe might be removed, and increased room given, by its being only half buried. Then a great deal of room would remain for gas pipes.

1213. Although you consider that this might be done, you consider that the pipes ought to be in the subway itself, or half of them at least?—I would prefer that they should be exposed, because, then, their durability is almost infinite; but if I had the control of a subway, and knew that in that subway there must be a three-feet pipe, and that there would be want of room, I would, from the beginning, have that three-feet pipe of water half buried in the earth, because I should know that by doing that, I should have room for the other things. If there was no such pipe expected, or likely to be wanted there, then I would lay them all upon the surface.

1214. Have you considered what would be the effect of frost upon the pipes exposed in the subway?—I do not think they would be affected by frost.

1215. Do

1215. Do you think that they would be effected by contraction?—I think not. I think that the temperature will be very even in the subways. There will be no hot rays of the sun, and they will not be effected by frost.

1216. Do you know that at present, as much as two feet below the surface of the ground, very great expansions and contractions are produced in the pipes?—I think that two feet under the surface, where they are exposed to the scorching heat of the sun upon the pavement above, and sometimes an iron pavement, the effect would be far greater than in a subway which is almost in the shade.

1217. Speaking of the gas leakage, you said it was excessive, and that the work was notoriously badly done. How do you propose that greater care should be exercised in the subways?—By the knowledge of all parties concerned that it would be constantly liable to inspection.

1218. It would merely then follow from the facility for inspection?—From the inspection, and the detection of the point where it had been badly put together.

1219. The principal leakage now takes place, does not it, from the service pipes?—Leakage does arise from the service pipes, no doubt.

1220. Service pipes are more liable to corrosion than the mains, are they not?—I think it arises very much from their being buried.

1221. They are made of wrought iron, and therefore more liable to decay, are they not?—Yes, that makes them more liable to decay, and being buried in the way they are also makes them more liable to decay.

1222. Do you consider that the ventilation of the two existing subways in London when the houses are built on both sides will be as good as it is now?—I think if the shafts which are proposed to be built at each end are erected, it will be quite as good as it is now.

1223. At what intervals would those shafts be?—At present, they contemplate only one high shaft at each end of that subway.

1224. That is one at each end of 3,200 feet in Southwark-street?—The small shafts are only 100 feet apart.

1225. You mean the gratings in the street?—Yes.

1226. How do you propose to maintain a current through the subway, seeing that the air in the subway is generally colder than the atmosphere?—There is a constant current there now. I have tried a good many shafts, and have found that almost every shaft took an up or a down current, and sometimes both.

1227. Is not the draught you now find caused by the circumstance that the houses are not built, and therefore the air comes in by the side passage?—The building of the houses may intercept it to some extent; but I believe that that will be cured by making the shafts at the crossings.

1228. Do you agree with the witness who gave two degrees of comparison for the ventilation; he said that neither was perfect—one was good, and the other fair. As it is not now perfect, but only good or fair, how will it be when the houses are built; do you think that the shafts will make it perfect?—I did not hear the witness to whom you allude. I think the ventilation will be good; I only judge from what I have seen myself at Nottingham. The ventilation there was almost as good in the subway as above; no doubt the atmosphere there is purer than in London; but in the subways here I consider the ventilation is very good.

1229. The perfection or completeness of that ventilation is essential to carrying off any leakage from gas, is it not?—I do not think it is absolutely essential; I think if a leakage of gas is detected, it would be desirable to use the safety lamp; that is, if there is an apprehension that there is a leakage; if it is smelt.

1230. When you speak of the use of the safety lamp, you know that that implies not the occasional but the constant use of it, for it has been given in evidence that the intention is that the waterworks companies' men must traverse these subways daily in order to let off and let on the water for the supply; is it desirable that that should be the constant practice?—I think each length of the subway ought to have an inspector attached to it, and that the orders to that inspector should be, that if on letting in a workman to see to the water pipe system, any unusual smell of gas is perceived, he should be ordered to use the safety lamp.

1231. I think you know the subways both personally, do you not?—I do.

1232. And also the plans of the two proposed subways under the Thames Embankment and the new street to the Mansion House?—I do.

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1233. What is the depth of the crown of those subways from the surface, in each of those four cases; first, the Covent Garden subway; what is the space from the surface of the street to the crown of the arch?—I will answer you first with regard to the Thames Embankment subway; it does not apply at all, because the subway there is in the thickness of the wall; the subway and the low-level sewer are both built in the thickness of the wall, so that it does not affect the street at all.

1234. They are built in the thickness of the wall, you say?—Yes.

1235. There must be some distance from the crown of the arch to the surface of the street?—It is partly under the footpath; in fact, it is almost entirely under the footpath; I cannot give you, from recollection, the exact height in any of these subways, but you may measure from that plan; the subway here is 6 feet 6 from the floor to the crown of the arch; by comparison, it would be about four feet from the crown of the arch to the street.

1236. How is it in Covent Garden?—It would be about the same.

1237. How will it be in the new street to the Mansion House?—That is undergoing alterations in connexion with the Underground Railway. I cannot say how it will be; it may be completely altered.

1238. Is the depth of each of those subways from the crown of the arch to the floor of the subway the same, leaving out the Thames Embankment?—Yes; 6 feet 6.

Re-examined by Mr. *Johnson*.

1239. My learned friend who began to cross-examine you asked you with reference to your means of communication with these French engineers; I think, if I am not mistaken, you were educated in Paris, were you not?—I passed some time at a military college in France.

1240. Therefore, you had abundant means of understanding all that the people said to you, and making them understand all you said to them?—French is nearly as familiar to me as English.

1241. You were asked also whether you were not professionally employed for the Metropolitan Board of Works?—Yes.

1242. Of course you were?—Of course.

1243. Had you any other object in going to Paris than to inquire into and investigate the system, and form the best and most unbiassed opinion you could upon the subject?—I had no other object.

1244. Nor any other directions?—No.

1245. M. Belgrand, whom you saw, is, I think, the engineer of the municipality, not one of the Imperial engineers?—He is.

1246. Do you know whether there is either between the municipal and the Imperial engineers, or between them and some other engineers, a diversity of opinion upon this very subject in Paris itself?—The subordinate engineer in charge of the gas pipes, who belonged to the Imperial Department, appeared to have no objections whatever to it certainly, while the other set of engineers had.

1247. We will call him the subordinate Imperial engineer; was that a M. Louis?—I forget his name; I did not write his name down.

1248. As regards the ventilation, what width of street are you contemplating in laying down these subways?—They are all wide; the Southwark-street is at least 70 feet wide.

1249. Do you know, also, that there are gratings now communicating with these side galleries, through which you say at present the air percolates?—Some experimental gratings have been opened partly at my request. Mr. Bramwell and I requested it should be tried, and they were found to answer very well; they had not existed before in these galleries, and they might be very easily introduced at a very trifling cost; they increased the ventilation very much; they have a very good draught of fresh air coming in.

1250. Supposing houses were built upon the sides of these streets, would it not be the fact that these air gratings would then open into the areas of the houses which were built?—Under the present form of building they would not open directly into the areas, but they could easily be carried in pipes along the party wall so as to open into the areas.

1251. If the object was to have ventilation from the side as well as from the centre,

centre, would there be the slightest difficulty in making those gratings so as to communicate with the open air in the areas at the side?—None, whatever.

1252. Would the same effect, as regards ventilation, be produced supposing the houses were built, and that these means of ventilation were adopted?—Supposing the houses were built, and passages made up to them on each side, as well as the shafts, I believe the ventilation would be as good as it is now.

1253. There may be some slight difference in the ventilation when the houses are built upon either side of the street where the ground is now lying unoccupied; but supposing these precautions to be taken, and side gratings to be put into the areas, would there be, whether an equal amount of ventilation or not, an adequate amount of ventilation to carry off any gaseous fluids that might arise?—I believe there would.

1254. As regards the streets being paved, the streets are not all paved, a good many in Belgravia, as we know, are macadamised; is it your experience that the pipes for the supply of the houses are put in before the houses are built?—I never heard of such a thing.

1255. My learned friend said that there was no power, as I understood him, for the Metropolitan Board of Works to form these subways. I happen to have the Acts before me, and I find in all of them express powers; here is the Covent Garden Approach and Southwark and Westminster Communication Act of 1857; that is the first in order; will you see whether that does not authorise the Board to construct subways?

The *Chairman* stated that the Committee did not consider it necessary to inquire into the powers of the Board to construct the subways already made.

1256. *Chairman.*] You have estimated the cost of laying pipes at 200 *l.* a mile in a street already made and paved?—Yes.

1257. Do you think it would cost 200 *l.* a mile to put the pipes into the subways?—I think it would cost rather less; I have no means of making an exact estimate of that, because that work has never been done yet; but I think it ought to be done for rather less. There is no pavement to move; against that absence of removing the pavement, you must set the making of some kind of truck and the other apparatus for moving the pipes along the subway, as well as for the standard which is proposed.

1258. Do you know what the total cost of laying down a main in such a street as that in Southwark, including the cost of the pipes, and everything?—A large 24-inch main will cost between 4,000 *l.* and 5,000 *l.* a mile.

1259. Mr. *Powell.*] Is that for the metal itself?—The whole work of it; the buying the pipes, the laying them, the leading them, and the establishing the main complete.

1260. Viscount *Grey de Wilton.*] You mean according to the present system, do you not?—In every street it will cost about that; for a 12-inch pipe, it will cost nearly 2,000 *l.* a mile.

1261. *Chairman.*] Supposing the mains to be put down in the new street which is to be made to the Mansion House before the street is paved, what will it cost a mile to put them down?—Supposing there to be no pavement, I think you would take 25 per cent. off the labour; perhaps instead of 200 *l.* you might say 150 *l.* for a small main.

1262. Then that would cost rather less than if it was put into a subway?—I think if there were no pavement or concrete the cost of laying down in a macadamized road would be perhaps about the same, or a little less, than in a subway.

1263. There would be no macadam to put on in the case, I suppose?—No; I think it would be rather cheaper than in a subway.

1264. The Mansion House street will be likely to be built upon immediately, will it not?—I imagine, being in a very desirable locality, it will be very quickly built up.

1265. You have made no estimate, you say, of what it will cost in regard to the chairs and carrying the pipes down into the subway?—No, there are no means of forming any further opinion. I think the cost of the chairs will be about 5 *s.* a-piece, and as to the cost of the labour of trucking the pipes along, that would be some little expense. It is difficult to say what the cost would be; it would not be a work of any great difficulty.

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1266. Mr. *Toulmin Smith.*] (Through the *Committee*). Are you aware whether the street of the Thames Embankment is to be macadamized or paved?—I am not aware whether it is to be macadamized or paved.

1267. Mr. *Powell.*] Can you tell me if there are any pipes now, either gas or water, or of any other kind, in the new Covent Garden street and in the new Southwark street?—In the Covent Garden there is one water pipe, and there are two gas pipes; in Southwark-street there are two mere street gas pipes of two inches diameter, each extending the whole way.

1268. You were saying just now that if the water pipes were full the gas could not get in?—Yes.

1269. Mechanically speaking, that is a truism; but, chemically speaking, supposing a water pipe leaked, and there was atmosphere surrounding that pipe strongly impregnated with gas, would not that affect the water?—The pipes are under such a strong pressure that any water leaking must come out with much too great a force to allow the gas to get in. You must first suppose that there are leaks in both pipes.

1270. I suppose that you have a water pipe which leaks, and the air surrounding it impregnated with gas?—I do not think the water could draw in the gas, because it would issue with too great a force; all the water pipes are under great pressure, therefore, I do not think the water could draw in the gas, in fact, we know it does not; if a gas meter is used, a very small pressure of water keeps it tight; the gas does not pass through it; the meters for gas are made with water; many meters are certainly dry meters, but the constant measure for gas is the water meter at a very small pressure.

1271. What is the condition of the water in the meters?—There is no gas in the meters; I never heard of such a thing; if the gas was in it the pressure would be reduced.

1272. Does not the water smell of gas?—If gas was capable of insinuating itself into water in that way, the meter could not be used, because the gas would be drawn through the water and escape.

1273. Your opinion is, that if you had a vessel full of water, and upon it a quantity of gas, the water would not be impregnated by the gas?—I believe not.

1274. Do you think that the effect of gas is to corrode pipes?—I have no doubt that gas, and the deposits from gas together, will corrode pipes.

1275. Supposing there are two gas pipes exactly under the same circumstances, both, as far as the pipes are concerned, more or less leaking; supposing that one of those pipes is surrounded by atmospheric air, and supposing the other is buried in the earth, will there be any difference between the leakage of those two pipes, owing to there being in the one case atmosphere surrounding the one, and, in the second case, earth surrounding the other?—I do not think that the earth round the pipes would be tight enough to stop a leakage. I think if you put equal quantities into the two pipes, the earth will absorb the gas which escapes from the pipe which is pressed in it; so that you will find that the gas escapes nearly, if not quite, as fast from the one as from the other.

1276. There have been for sometime pipes, either in Covent Garden or in the Southwark-street subway, in the one case buried and in the other not buried; has the experience of the few months that have elapsed shown that contraction and expansion does take place in the subways?—I have heard of none, but the engineers who accompanied me were not in charge of the pipes; I think it is not likely.

1277. Did I rightly understand what you said, that you would have two tall shafts rising above the surface of the ground for ventilation?—Yes; those shafts are proposed to be made in the open space, in the centre of a large crossing, for foot passengers to take refuge at; they would be like the lamp posts which are put up now in such places.

1278. Take two subways, one a longer one and the other a shorter one, which should you expect would be the best ventilated, supposing the area or the section to be the same in both cases?—If the air holes are equally placed in both, I think there ought to be very little difference. In some cases, if a short subway in a favourable position has a cross shaft, it might be better ventilated in the long run; but if the openings for air are properly made I think there ought to be very little difference.

1279. Mr. *Richards.*] (Through the *Committee.*) Some allusion has been made

made to the Thames Embankment; do you suppose that a gas main would ever be carried along the Thames Embankment, a place where there would only be houses on one side of the street, in preference to being carried along a back street where there would be houses on both sides of the street?—I think many mains are made which are not for the service of houses close by; they are taken to carry water for the service at a little distance. The Thames Embankment being little more than a mile long, I think it might turn out very useful to the companies for that purpose, especially for water, because it would be so easy to get access to it.

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1280. You mean it might be used for a through main?—Yes, for a through main.

[The Witness withdrew.

Mr. *Marriott Ogle Tarbotton*, is called in; and, having been sworn, is Examined by Mr. *Wilkinson*, as follows:

1281. ARE you a civil engineer, and surveyor of the Corporation of Nottingham?—I am.

Mr. *M. O. Tarbotton.*

1282. Have you had large experience in public works?—I have been during the last three years actively engaged as surveyor to the Corporation, and, of course, during that time, have been extensively employed in public works, such as sewerage and other kinds of works.

1283. Have you examined the Bill as to the use of subways under the consideration of this Committee?—I have.

1284. Have you also examined the petitions which have been presented in opposition to that Bill?—I have.

1285. Have you, independently of the examination of this Bill, paid attention to the subject of subways as a relief to the constant interruption of traffic by alterations in the surface of streets?—I have given great attention to this subject for a great number of years, feeling the great public inconvenience which arises, and which is so notorious from the continual breaking up of the streets, for gas, water, sewage, and all other purposes. According to the present appearance of things, there is an extreme probability that the breaking up of the streets will rather increase than otherwise.

1286. You have given your attention to it?—I have.

1287. So that you are now speaking not merely from your experience of this particular case, but from study and bygone experience?—Just so.

1288. Without going into details at all, as to the allegations in the petitions, let me draw your attention very shortly to the different heads upon which I should be glad that you would give the Committee your opinion; first, directing your attention to the subject of gas mains, and the mode in which the mains can be laid?—With regard to gas pipes, and the laying of them in subways, I am of opinion that they can be more carefully and less hurriedly laid than they can in the streets; they are open to constant inspection from time to time, and of course, leakage can be immediately detected.

1289. Have you had any experience in the laying of gas pipes and their removal?—Yes.

1290. But with regard to the vibration and corrosion?—With regard to the vibration of gas pipes in subways, I do not see that there is any possibility of such a thing taking place at all.

1291. Do you again speak with regard to vibration, from your own experience?—I do.

1292. What do you say with regard to corrosion?—With regard to corrosion, I think that corrosion would be much smaller in a subway than it would if the pipes were buried in the clay, or in the ground; and further than that, the most fertile source of leakage with respect to gas is at the gas service. I think it is generally admitted that that is the case. They are formed of wrought iron. If those services were laid open to special inspection, and subjected to perpetual painting and repair from time to time, of course that very fertile source of leakage would be removed to a very great extent, at any rate.

1293. Has your attention been directed to the leakage from the pipes; do you suppose that there is any leakage or any exudation from the pipes?—I am not

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not prepared to speak very positively on that point. With regard to exudation through the pores of the iron, that is a subject which is now attracting chemical attention. I have not given much attention to it myself. With regard to leakage from joints of gas pipes, we all know that gas pipes are peculiarly liable to leakage.

1294. Can you, or can you not, give the Committee any idea whether there is any greater exudation through the metal when the pipe is laid in a trench, surrounded by earth, or when it is surrounded by the atmosphere only?—I have no experience upon that particular point.

1295. With regard to leakage arising from the connexion of the gas services, that you state can be more readily inspected by means of the subways?—Very much easier.

1296. With regard to ventilation, speaking from experience, have you had any difficulty on that subject?—We had no difficulty at Nottingham with respect to the ventilation of the subway. My experience is confined to Nottingham and London. I have examined those in London, and they are free from impurity.

1297. With regard to water, do you think the objections made on the part of the water companies are substantial?—I can see no possible objection to laying water mains in subways. I think that all the arguments which apply in favor of gas mains, apply equally in favor of water mains; but I think that the danger which some people anticipate from laying gas mains in subways does not by any means apply to the water mains. I think water mains could be laid with the most perfect security in subways.

1298. We have heard the objection stated, that costly apparatus is necessary?—I am not aware that any costly apparatus is necessary at all; no irregular castings are required. The mains are laid down as they would be in the streets, and, probably, it depends on the level of the subway beneath the surface of the ground. If the mains were laid in the subway without support they would simply drop down, and lie on the floor of the subway. No castings would be required at all beyond those which are daily employed in the water service.

1299. Do sewers and drains present any difficulties in the laying of water mains?—None, whatever. The sewers are, of course, laid in the subway prior to the laying of the water mains; they are permanent works, and are not disturbed in any way whatever.

1300. Has your attention been directed to the suggested difficulty of crossing a street at right angles in which a subway does not exist, by a street in which a subway does exist?—I have thought of the matter, and I do not see any practical difficulty at all with respect to passing the water or gas pipes from one portion of the street to another, where that part of the street is bisected with another street by a subway. The pipes can either be taken over the subway, under the subway, or, in case of necessity, through the subway, without any difficulty. Of course it depends much on the depth of the subway below the surface of the street. In some cases, such as the Borough, in London, the depth of the sewer regulates, to a great extent, the depth of the subway; because a subway made on that principle is placed above the sewer, therefore the height is minimized very considerably. In that case, it was necessary to pass the pipe through the subway. In some cases the subway would be so low that the pipes might be placed over it; it would depend entirely on the depth of the subway.

1301. I will now take you to your own experience in Nottingham. In the years 1861 and 1862 the corporation purchased some land in the centre of the town, and formed two new streets there, did they not?—They did; they purchased a large quantity of property, and took the whole of the property down, and formed two new streets, one called Victoria-street, and another called Queen-street.

1302. Was that under your sole charge and direction?—Entirely.

1303. Did they avail themselves of that opportunity of testing this principle of constructing subways under those streets?—Yes, they did.

1304. Will you show to the Committee the plans of those subways?—This is a general plan (*producing a Plan to the Committee*) showing the two streets laid out as now ready for being built upon. One street extends from the Poultry and Cheapside up Carlton-street, and is 50 feet wide. Another street extends from Carlton-street to Queen-street, which is 40 feet wide. In both these streets, subways have been made, as is seen by the double red lines which show the walls

walls on each side down the centre of the street, and show the vaults on the sides of the streets, which of course belong to the property when erected, some portion of which is already erected. The sideways extend from the subway to the vaults opposite each property. I have a large plan here, which shows it more extensively (*producing a second Plan*).

1305. *Chairman.*] Is the principle the same as that of the Covent Garden subway?—Very nearly; but there are some differences which I shall be able to point out. This is the subway in Victoria-street; that is the subway in Queen-street. Generally, the principle is the same as that of the subway in Covent Garden; but there is a little difference from the way in which the houses are connected with the subway. This is a Plan showing the subway, and, also, showing the vaults on both sides. The difference in the principle of the connexion between the subway and the houses, in this case is, that I have a side-way, or side-connexion, as may be seen in the Covent Garden subway, one to each property. One does not serve two properties; therefore, each house has its own side-way for the drain, and for the gas and water services. The gas and water mains are laid as upon this plan, and the difference between this and the Covent Garden subway is, that the mains are perfectly exposed. The water main is here, and the gas main is there (*pointing them out on the Plan*). The service is carried forward from each, as is shown on this Plan. Under the water main, the flooring of the subway is paved or tiled. There is a channel down the centre, and, at intervals, there are gratings in the floor of the subway, so that any escape from the water pipes, either from fracture or any other cause, or from services which are made from time to time, or from stripping off the thread of the service pipes, or any casualty, such as leakage, of course passes directly through these gratings, at intervals, into the sewer, which is underneath. In the side-way there is a double wall between the subway and the vault, which is built for the purpose of extra security, so that in the case of a house being uninhabited, or a plot of land not being built upon, it forms rather a stronger security between the outer land and the building, or the subway, so that persons cannot so readily get through the subway.

1306. Are the service-pipes under the ground?—The service-pipes are exposed in all cases. The gas services are laid from the mains, and supported upon stone sleepers which are shown here and there on the Plan. Of course they are always exposed. They are secured to the stone-sleepers by means of lead; they are run into the upper part of the stone and become perfectly rigid and immoveable, and along the subway and along the vaults they are secured by means of brackets to the wall. There are coupling collars at every other joint, so that the whole of the service-pipes may be disconnected from end to end without pulling up the services in the houses, so that any portion may be dismembered at any particular time, either for inspection or for repair. Of course, the water service is conducted in the usual manner. It is connected by means of a brass ferule with the main, and by a lead pipe is conveyed from the sleepers, the same as the gas service, straight forward into the houses. The service drains are laid in the sideway and connected with the sewer. The hydrants to the water mains, and the service of the street, for the purpose of supplying the street with water, in case of fire, are conveyed direct from the main in the street through the surface of the street. The hydrants are at given points in the usual manner.

1307. Your floor is not level, and your service-pipes are above the floor?—The floor is level.

1308. The service pipes are just sufficient to trip a man up?—Yes.

1309. And a truck could not pass along?—It could not by our present arrangements, but the service pipes might be conveyed along the floor or under the floor. The principle which I rather advocate is, that the service pipe, as well as the main, should be entirely exposed. Of course they are subject then to perpetual inspection, and are not so liable to corrode. With regard to the inconvenience which might be thought to arise by reason of the flooring giving way in case of repair, or in case of any work having to be done in the subway, a very simple arrangement is to form a gangway, as is done in the case of shoring.

1310. Mr. *Powell.*] I suppose by laying a few planks along?—Yes.

1311. Mr. *Wilkinson.*] That is the mode which you practically adopt?—Yes.

1312. Viscount *Grey de Wilton.*] Do you lay your main pipes upon chairs?—No,

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—No, the main pipes are simply laid upon the ground. The water pipes are perfectly exposed as you see them here.

1313. How do you secure them?—Their own gravity secures them.

1314. What is the nature of the ground?—The ground under the water pipes is tiled with earthenware tiles. The ground under the gas pipes is simply sand and gravel. The gas pipes are slightly buried in that.

1315. Mr. *Powell.*] Is the floor under either concrete?—No, the floor is simply the natural soil, except that portion which is under the water pipes, which I have explained already.

1316. Mr. *Wilkinson.*] Have you anything to state to the Committee with regard to the ventilation?—With regard to the ventilation of these places, there is an entrance into the sewer from the bottom of the subway. This is the entrance to the sewer (*referring to the Plan*). There is a ventilator over each of these. Therefore, in case of the iron door being lifted up, for the purpose of getting into the sewer at any time, any exudation would go through the ventilation.

1317. You show this plan to the Committee, in order to satisfy them that the means adopted for ventilation are sufficient?—I consider them to be perfectly sufficient.

1318. Have you found them to be practically sufficient?—I have.

1319. I presume the buildings are here (*referring to the Plan*)?—On one side of the street, and one or two on the other.

1320. Mr *Powell.*] You say there are buildings on one side of this street; is that part of the town, speaking generally, populous or sparse?—It is the most densely populated part of Nottingham, and I should think as densely populated as any part of London.

1321. *Chairman.*] In fact, it is the most populous part of the town?—Yes; it is so densely populated that in consequence these two new streets were found necessary.

1322. Mr. *Du Pré.*] How is it that your subway is three feet narrower than the Covent Garden subway?—I find that this is quite wide enough for our purposes; in Victoria-street it is 10 feet wide, and in Queen-street it is only eight feet wide; that is one of the cross streets. Generally speaking, in a town like Nottingham, eight or 10 feet wide would be perfectly wide enough, because the mains are not so extensive. This is a sketch of a subway for another part of the town, where we are limited in point of depth. Arrangements are made here for the water mains on one side, and for the gas mains on the other. The water is drained into the sewer by means of gratings at intervals, as in the other case. It is proposed, in this case, to fix a ventilator over the outlet or the junction of each sideway with the subway. It is also proposed to slope the roof of the sideway, so that any gas that possibly might escape by any means might make its way to the ventilator direct.

Mr. *Richards*, with the concurrence of the Committee, proceeded to cross-examine the Witness on the Plan.

Cross-examined by Mr. *Richards.*

1323. I see you have got here gas mains and water mains; one on one side, and the other on the other side; is that the actual state of things, or is it merely put as the exemplar of what the state of things will be?—It represents the actual position of things.

1324. Then, in fact, you supply the people on one side with gas, and the people on the other side with water?—No; I did not wish to confuse the plan by adding too many pipes; of course the gas main is brought this way properly (*describing it*).

1325. Mr. *Toulmin Smith.*] Each crossed the other?—Clearly.

1326. Mr. *Richards.*] So that any workman coming along this gas main has to make his way through these different service pipes?—No; the water main is carried directly on the floor of the subway, therefore the water main is perfectly out of reach.

1327. I am speaking of the service?—Yes.

1328. The water service lies on the floor?—Yes; and the gas service is brought, in our case, about a foot above.

1329. Any

1329. Any man walking along has to step over the various service pipes?—Yes; but whenever those service pipes occur, they are underneath the ventilator.

1330. Do you mean that you have a ventilator at every house?—As near as possible.

1331. What?—We have not one at every house.

1332. How many feet are your ventilators apart?—About 60, I believe.

1333. That is something very different to every house?—There happens, at the present moment, to be one to every house; the ventilators supply sufficient light, so that the service pipes may be seen.

1334. So that, I understand you to say, you can see them, but still they have to be stepped over?—Yes.

1335. Which would render it utterly impossible that a truck could go along?—By no means.

1336. How could a truck go along over the service pipes?—A truck would not pass over the bottom of the subway; it would be passed over on blocks and on gangways.

1337. On gangways, above the service pipes?—Clearly; if it were necessary to have a truck passing along the subway at all, it would be passed on a solid platform or gangway.

1338. So you diminish the available height of the subway?—Yes.

1339. What is the diameter of the gas main?—I think that is four inches, or it may be five inches.

1340. We do not think much of that in London?—No; nor we in Nottingham either.

Further Examined by Mr. *Wilkinson.*

1341. Will you give my friends the length of the subway in Victoria-street?—Four hundred and thirty feet.

1342. And the length of the subway in Queen-street?—One hundred feet.

1343. Will you give the diameter in Victoria-street?—The width in Victoria-street is 10 feet; the height 6 feet 6 inches.

1344. That is the same height as in Covent Garden?—I think it is nearly thereabouts.

1345. What is the width in Queen-street?—Eight feet wide, six feet six inches high.

1346. The whole is formed of brickwork, as we see by this plan, and the sewer is constructed under the floor on each side?—Yes.

1347. You have explained the position which the gas and water-pipes respectively hold; were they laid by you, or were they laid by the companies themselves?—They were laid by the gas company and by the water company.

1348. Were they laid in the position which they now occupy by the engineers of those companies?—Yes.

1349. Without any special directions from you?—I gave no directions whatever; they were laid by the companies' own engineers.

1350. Have those arrangements been found in practice perfectly successful?—They have up to the present time been perfectly successful; we have had no leakage from the gas or water-pipes; we have had no smell in the subway; and the ventilation has been considered perfectly effectual up to the present time.

1351. With regard to the temperature of the subway, a question was asked of a former witness with reference to damage by frost; I believe you have had experience of damage by frost in Nottingham?—We had a severe frost last winter, which of course would have affected the pipes if they were subject to that influence; but we had no difficulty, complaint, or stoppage, and no accident whatever; in fact, the temperature of the subway is very uniform.

1352. Can you give us the average temperature?—I have taken it; but I have not it with me.

1353. Of course, you are frequently in the subway yourself?—I have been constantly.

1354. Have you ever sustained inconvenience from the smell?—No.

1355. You have explained to the Committee that ventilation is provided by openings in the crown of the arch; will you give the dimensions of those openings?—The size of those openings is about 17½ inches by 8½ inches.

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1356. And they occur at distances of about 25 yards?—About 20 yards, I believe; one or two are 25 yards.

1357. Have you ever had any complaint from either the gas or water companies?—I have heard of none.

1358. I presume you would have heard, from your official position, if there had been any?—I suppose so.

1359. Are the Corporation so well satisfied with the result of your experiments that they are about to lay subways in other streets?—I may state that we have had several influential and intelligent members of the Corporation on the committee which has had the conduct of these works, and those gentlemen have examined the works from time to time; they were in the subway along with some engineers from London, Mr. Hemans and Mr. Bramwell, about a fortnight ago, and they expressed themselves so thoroughly satisfied with the arrangements in the two new streets, that it is their intention to pursue the system as far as possible.

1360. You propose to introduce subways in the new streets?—I propose to do so.

1361. With the sanction of the Corporation?—Yes.

1362. Has your attention been directed to the possible contamination of water by the gas?—I have thought of that subject.

1363. First of all, have you had any complaint of that kind?—We have had no complaint whatever with regard to the contamination of water by leakage from gas pipes. It is very clear that if the leakage is reduced to an infinitesimal amount, which we hope it may be and should be, by these pipes there would be no means of contamination.

1364. Has it, in fact, been done?—It has been done; but the laying of gas pipes in subways is not at all analogous to the laying of gas pipes in streets closely adjoining water pipes, where, if there is any leakage from the gas pipe, it permeates the subsoil, and, of course, the whole strata becomes more or less infused with gas. I have heard that cases have occurred of gas getting into water pipes, the water pipes have been run off, and been empty; but if there be no escape of gas in the same trench, that, probably, could not have taken place. The object of these subways is to prevent that contamination, by having the work more properly done than it is now, and more specifically examined. I am of opinion that by these means we shall accomplish all that we seek to do.

1365. You have given the Committee the size of your subways, and you have stated that they are sufficient to contain all the pipes which are at present required; have you any doubt as to the facility of arranging a subway so as to contain all the pipes which may be required to supply the wants of the inhabitants?—There would be no difficulty whatever; at the present time we have only the gas and water pipes and the telegraph wires.

1366. Would those pipes occupy the subways so completely as to prevent other necessary pipes from being laid down?—By no means, in our case; there would be no difficulty either in Nottingham or London in providing sufficient accommodation.

1367. You have no Pneumatic Dispatch Company in Nottingham?—No.

1368. You have answered my questions with regard to the grounds of objection stated by these companies; are you of opinion that independently of any objection, the companies themselves would derive benefit and advantage from these subways?—I think so.

1369. Will you state shortly in what respect?—In the first place, the original cost of laying the mains in the subways would be much smaller than it is at the present time.

1370. Do you speak from practical knowledge of that?—I do.

1371. Have you compared the expense of the two systems?—Yes, I have.

1372. Can you give the Committee any details of that?—The details are as follows: the excavation for the pipe is not required, and therefore the expense is not incurred.

1373. *Chairman.*] What is the expense of excavation?—The expense of excavation varies with the size of the pipe; with a pipe of seven or eight inches, the expense, in our case, would be about 88 *l.* per mile.

1374. For an 8-inch pipe?—Yes.

1375. Mr. *Wilkinson.*] Will you confine your attention to the new streets?—I am doing so. In the next place, the cost of paving would not be incurred, and the

the cost of paving in Nottingham per mile for that size pipe would be about 50 *l.* without concrete.

1376. *Chairman.*] In your new streets there will be no paving?—If the mains were laid prior to the paving of the street, the expense of paving would not be incurred.

1377. Mr. *Wilkinson.*] The cost of paving, if the paving were not required, would be saved?—Yes, that would be about 50 *l.* per mile.

1378. Is there any other cost that would be saved?—If the paving were placed on the concrete, which we have been lately in the habit of doing at Nottingham, there would be the cost of 146 *l.* a mile in concrete.

1379. *Chairman.*] Instead of 50 *l.*?—No, plus the 50 *l.*; the 50 *l.* is for the paving only, and the concrete foundation under the paving would be 146 *l.* a-mile.

1380. Mr. *Powell.*] Do you mean the disturbance of the concrete foundation would come to that?—I am referring now to a street where the foundation is laid and the paving is complete; of course, if it was a new street entirely those items would be expunged.

1381. Mr. *Wilkinson.*] Your illustration is that of a new street taken up partially for the purpose of laying down the pipes, and then restored to its original condition?—Exactly.

1382. Can you give the Committee anything like the amount of saving which you think would result from the use of subways, that is, with regard to laying down pipes?—The sum would be represented by the cost that I have given you.

1383. It would be a saving, as I understand you, of something like 300 *l.* a mile?—About 200 *l.* a mile.

1384. Then you imply both concrete and paving, do you not?—The concrete and paving would be about 200 *l.* a mile. The excavation of course would apply to both old and new streets.

1385. Your items are excavation, paving, and concrete?—Just so.

1386. Is there any other item which would be peculiar to the present system of laying in trenches, with regard to the saving effected by the system of laying pipes in subways?—I am not aware of any other.

1387. Do you think there would be some economy in maintenance?—I think that the item of maintenance would be much less in a subway than it would be under the ordinary practice.

1388. Arising from facility of inspection and continual supervision?—No; there ought to be a large saving in leakage, which is a serious item with some gas companies.

1389. Would there, in your judgment, be a greater certainty of the work being successfully and carefully done by reason of the facility for inspection and supervision?—Clearly.

1390. Comparing the two systems, would there be a greater facility of stopping the leakage before it attained any extent in a subway, than in the ordinary method?—Certainly; there is another item which is of importance with regard to water pipes. Under the present system, as you are well aware, the streets are being constantly pulled up for services of all kinds, and very often for new sewers. The water pipes are generally laid in the centre of the street, and whenever new sewers are made the ground naturally falls. It is impossible to make the ground look as it was originally, the consequence is that a settlement takes place constantly and cannot be prevented. We have heard many instances of pipes breaking and floating the trenches; of course there is a loss of water to the companies. Sometimes it is charged for and paid for by the authorities; of course it is a perfect waste of money. Further than that the pipes are perpetually damaged because they can only be joined by collars, or some such apparatus as that, of course the annoyance is exceedingly great.

1391. All of which would be obviated by this system?—All of which under this system may be obviated.

1392. This system being, to a certain extent, an experiment in Nottingham, do you allow the free use of the subways to the companies, or do you charge them anything?—No charge has been made in Nottingham for the use of the subways, either to the gas or the water company, and I believe there has been no discussion hitherto as to what charge shall be made.

1393. I understood you to say, that the gas and water companies laid the pipes at their own expense?—Yes.

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Further Cross-examined by Mr. *Richards.*

1394. No charge made?—No.

1395. So that no doubt it will come cheaper to them than if they laid their pipes in the open ground?—Of course.

1396. You did not take compulsory powers to compel the gas and water companies to go into your subway?—No, we have not done that.

1397. That might make a difference in their willingness, might it not?—Possibly it might.

1398. They would then balance the question, which was the most expensive method, would they not?—That is possible.

1399. Is it not also possible that they would be as likely to arrive at a correct conclusion as the town surveyor of Nottingham, as to what was the most expensive method of doing it?—I do not clearly understand what you mean.

1400. Do you not think that the gas companies would be likely to know which was the most expensive method of laying their pipes in the open ground or the subway?—The gas companies ought to be able to do so.

1401. At present they enjoy the advantage of having no charge at all?—They do.

1402. You have been speaking, I understand, of new streets, and not of old streets?—Of new streets.

1403. Those are streets which have been newly erected by the Corporation of Nottingham?—They are essentially new streets.

1404. When you talk then of one of the items of expense of laying pipes being the cost of paving, are you correct in that in the case of a new street?—In the case of an entirely new street, I apprehend the gas and water companies would have the good sense to lay their pipes before the paving is done; they generally do so, but not always.

1405. Therefore, the cost of paving which you bring into the calculation, is not a legitimate cost against the charge of laying mains in a new street?—Not in a perfectly new street.

1406. Is it not also the same with reference to concrete; is there a street at Nottingham with a concrete foundation?—Yes.

1407. Is that so in either of these new streets?—In both of them.

1408. Your experience of subways, I presume, is entirely confined to the town of Nottingham?—Entirely so.

1409. One of which is about double the length of Westminster Hall?—One is about the length of the one in Covent Garden, and the other is 100 feet. The streets were no longer than that, and therefore we could not make the subways longer.

1410. Your mains are 5-inch mains?—I believe so.

1411. You are aware that the London mains are much larger?—So they are at Nottingham.

1412. However, you have not got any main in a subway of a larger capacity than that?—No.

1413. You have given an answer with considerable readiness, that there is not the slightest difficulty in crossing at right angles; you have not much opportunity of testing that practically with your two new streets?—We have not had occasion; it is merely an opinion.

1414. Merely an opinion you have formed, and not from the result of any experience?—No.

1415. My learned friend put it to you that you have had considerable experience as to the laying of gas mains; does the surveyor of Nottingham lay the mains for the Nottingham Gas Company?—He has nothing at all to do with it.

1416. I believe they are not the best friends in the world; at least they were not the week before last?—I do not know that there is any unfriendliness between them; personally, I am sure there is none.

1417. You have never laid any gas mains, have you?—Yes, I have.

1418. In what capacity?—I have laid gas mains in Wakefield, for the Wakefield Gas Company.

1419. Before you went to Nottingham?—Yes; I was employed by the gas company there.

1420. Then your experience is in Wakefield?—Yes.

1421. Then you are a person, I dare say, who can tell us what is the cost of laying 100 yards of 8-inch main?—Of laying only?

1422. Of

1422. Of laying 100 yards of 8-inch main; or perhaps it would be easier for you to give the cost per yard?—Do you mean the whole cost of laying?

1423. I mean the whole cost of laying, including pipes and everything; what was the cost of laying down 100 yards of 8-inch main in Wakefield?—The total cost of an 8-inch pipe would be about 810*l.*

1424. That includes the cost of the iron?—That includes the cost of the iron, the cost of the lead, and the cost of laying.

1425. What is the mere cost of laying per mile?—The cost of laying per mile, according to my experience, would be about 183*l.*

1426. *Chairman.*] What diameter is the pipe?—8 inches.

1427. Mr. *Richards.*] Of course the cost of laying larger mains becomes very much more considerable?—Very much more so.

1428. Probably, your experience does not enable you to say what is the cost of 24-inch mains?—I am not quite sure; I think I have laid one. I have laid them up to 18-inches gas mains.

1429. To what extent?—I cannot remember at all.

1430. You know the name of Aird, the great layer of pipes in Glasgow, I dare say?—Yes.

1431. Do you know at all what it would come to per-yard, if you were to take that cost at 4 per cent.?—It can be worked out; I have not done so.

1432. My friend Mr. Baxter has worked out at your price of 183*l.* for laying per mile, which seems to come out at only 2*s.* per yard?—I have not worked it out myself.

1433. *Chairman.*] How deep?—About 2 ft. 6 in. deep. The price I give you now is without paving entirely; it is simply excavating the trench about 2 ft. 6 inches. The price would be considerably greater in London; at least 25 per cent.

1434. Mr. *Richards.*] Then we may say 2 *s.* 6 *d.*?—I should think it would cost more than that.

1435. I am putting iron now out of the question; opening the trenches, laying the pipes, the yarn, and lead for the joints, and filling in?—Simply filling in and no paving at all, the paving extra.

1436. What is that about? You have worked it out at 183*l.* a mile, which divided by 1,760, works out at 2 *s.* per yard?—I think it is rather more than that.

1437. Or, according to London prices, you say it would be 2*s.* 6 *d.*?—I should say more than that.

1438. It is merely a matter of calculation. Suppose you take that 183*l.* at 4 per cent., should you be surprised to find that it comes to about 1 *s.* per yard?—You mean to capitalise it. I beg to state with respect to these prices, that our prices can be of no service to you in London, because they are prices for work which has been done under my own directions, and quite in a country place.

1439. I suppose, although the prices you are giving are Nottingham prices, and not London prices, still the comparison between the prices of the two modes of laying at Nottingham, is perfectly good?—Yes.

1440. When were you first spoken to on this matter?—In respect of this Bill?

1441. Yes; when did the Metropolitan Board of Works find you out?—Probably about a month ago.

1442. You have examined the Bill, and Petitions against it also, before you gave your opinion upon them, but of course you examined them in the interest of the Metropolitan Board of Works?—Not by any means; I examined them perfectly independently of the Metropolitan Board of Works. I have given this subject my consideration for a great length of time, and I am stating my own experience.

1443. I am imputing no more to you than I impute to myself, namely, that you were engaged by the Metropolitan Board of Works when you first took this matter in hand, the same as I am engaged by the Gas Company?—Yes. I am engaged by the Metropolitan Board of Works.

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Cross-examined by Mr. *Toulmin Smith.*

1444. Although you have told us a good deal about these subways at Nottingham, one important point has not been brought out; what do they cost?—The cost of the subways in Nottingham, which we have constructed, I canot give you, for this simple reason, that the new streets were formed in the oldest portion of Nottingham. We have had to carry them through rocks and excavations, which are three or four centuries old, and the subways are constructed of the old bricks which have been obtained from the buildings which have been taken down, and which are a very superior quality of bricks. I can give you an estimate of what the subways in Nottingham would cost if they were constructed of new materials in an ordinary street, where we had not those exceptions.

1445. Will you give that?—About 3 *l.* 11 *s.* 6 *d.* per yard.

1446. What does that include?—That includes a subway with shafts for ventilation.

1447. And the earthwork?—And the earthwork.

1448. And the side passages?—No, the side vaults are charged to the property.

1449. I am speaking of the side passages?—The side passages are also charged to the property; I have stated that there is one to each property. The party who builds upon the land pays for the cost of the works, according to the length of his frontage; and he also pays for the length of his own sideway. Therefore, my estimate includes the subway proper.

1450. The prices you spoke of were Nottingham prices?—Yes.

1451. You gave the size of the gas mains, but you did not give the size of the water mains?—They are the same size.

1452. You stated that those were fixed by brackets?—The service pipes.

1453. Supposing there was more than one pipe necessary in the subway, how would you arrange them?—I should place the mains alongside each other.

1454. Do you mean on the floor?—Yes.

1455. Of course you are aware of the large size of the London mains, 30 inches and 3 feet; how many of those could you lay on the floor?—That would depend upon the size of the subway. If I had to provide for laying on the floor two or three rows of 36-inch pipes, of course the subway would have to be proportionately constructed.

1456. It is not contemplated by the Metropolitan Board of Works to lay several large sized mains on the floor?—I do not think, in the case of the Metropolitan Board of Works, that it is probable there will be so many pipes as three or four rows of 36-inch pipes.

1457. It has been given in evidence in this room that there are single companies who have as many as four pipes in one street; of course, not all of them of that large size?—In Regent-street, the Strand, and the leading streets, there may be a great number of pipes; but, of course, in new streets the gas and water companies would not be allowed, nor would it be their interest, nor would it be possible to lay many pipes. I mean possible, in this sense: it is not at all likely that all the gas companies in the metropolis will seek to lay their mains through the Covent Garden subway or the Thames Embankment. Of course, the service main would be confined to the gas company supplying the district.

1458. Take the case of a company like the Chelsea Water Works, which thinks proper, deliberately, to have two mains, one for filtered water, and one for unfiltered water: in such a case as that, you must have two mains for one company?—It is only a question of the size of the subway.

1459. Those questions have not arisen in Nottingham?—They have not.

1460. You have spoken of the ventilation of these subways as being quite sufficient; the distance between the air holes is 60 feet, I think, you say?—About that.

1461. Do you consider that necessary?—I thought it was necessary when the plans were considered; we found them perfectly successful.

1462. Are you aware that in London they are only one in every 100 feet?—I believe they are further apart in London than in Nottingham.

1463. Although the subways are much larger the man-holes are more distant?—That may be the case.

1464. You

1464. You put in those holes in order to maintain the pipes?—Yes.

1465-6. In your small subway you have one in every 60 feet, but in London, where the subways are larger, they are one in 100 feet?—The ventilation is thoroughly perfect in our case. I have no doubt that if the ventilation is not found perfect in London, that others could be very readily constructed at a very small cost.

1467. You are aware that in the majority of these pipes lead is used?—Yes.

1468. Have you ever been in a subway when they are jointing up with lead?—Yes.

1469. What has been the state of the subway at that time?—It has been in the usual state.

1470. Has any sense of smothering overcome you?—No.

1471. How do you think it would have been if they had been leading a 3-feet pipe?—I do not think there would have been any difficulty at all. I have been leading pipes lately of 3 feet 6 inches diameter, down a narrow trench, without any difficulty.

1472. A trench closed at the top?—As nearly as possible closed.

1473. Do you consider the subways you made in Nottingham of the necessary size for the use of the town?—I think they are larger than is necessary; I think a subway eight feet wide is quite wide enough for Nottingham. Provincial towns are not like the Metropolis, where there are a great number of gas and water companies. In a provincial town, generally speaking, there is only one company of each kind; therefore, the same argument does not apply to provincial towns which applies to the Metropolis.

1474. You know the size of these subways?—I do.

1475. Do you consider these are large enough for London?—That depends on circumstances; they are large enough for the purposes for which they are now used. If it was required to lay larger mains they would be found sufficiently capacious. If it was required to have a larger number of mains, of course the subway would have to be increased in size accordingly.

1476. Your experience of gas pipes only extends to 18 inches diameter?—Up to 36 inches.

1477. You heard Mr. Hemans state that the laying fresh mains was pretty nearly the same whether in a road or a subway?—The cost of laying mains would differ very little the one from the other.

1478. I think you stated to this Committee that the cost of laying in a subway was less?—It is less, on account of the excavation; but the actual cost of making the joints would be as much in a subway as out of a subway.

1479. Mr. Hemans included the general cost of excavation and the other works?—There may be a little saving; there is not that trouble that there is in the streets, or that confusion which there is in the streets.

1480. Your answer upon that point did not touch the question of the cost of removal?—I have not given any evidence at all on the cost of removal.

Re-examined by Mr. *Wilkinson.*

1481. My friend, Mr. Richards, asked you a question as to when your attention was first directed to the subject. Is it the fact that, as a public officer of the town of Nottingham, your attention was directed to the measures which were about to be taken by the Metropolitan Board of Works in London for carrying out these works?—I have had it under my consideration for a long time.

1482. Finding that the Metropolitan Board of Works were about to carry out this idea, did you obtain assistance from them and borrow their plans?—I had conversations with some of the principal officers of the Metropolitan Board of Works, and I had their plans lent me; but with regard to the principle generally I have directed my attention to it for a great number of years. In 1857, when the Metropolitan Board of Works advertised for designs, I prepared some designs not very dissimilar to those which I have produced, but they were not completed in time; they are in my office now.

1483. With regard to the question of economy, you gave my friend, Mr. Richards, some details as to the cost. I understood you to say that, so far as regards the actual cost of the pipe itself, and the joints of the pipe, no difference exists between that in either of the ways?—No, I do not see much difference in that respect.

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1484. But you have stated that the economy, in your judgment, is very considerable in the use of the subway, and that that economy is occasioned by the absence of the necessity of taking up the soil, of putting the concrete, and replacing the pavement?—Yes, in the streets which are paved already.

1485. There is also an economy, is there not, in the greater facility of access which the subways would supply?—Yes, very considerable.

1486. There is another item of economy in the much less amount of leakage which, in your judgment, would result from laying the pipes in the subway?—Yes.

1487. Are you in a position to give the Committee any information as to the relative amount of leakage which may be expected under their system?—No, nor any one. I should state that with regard to having continual supervision over mains and service pipes, no figures can represent the saving; it is a matter of convenience that you cannot put into figures at all. With regard to leakage from the mains and service pipes that would be purely speculative. The gas companies only know what the aggregate leakage is from the works. They cannot apportion the leakage, and say so much arises from the service pipes, and so much from the mains. Of course, in well regulated gas companies, where new mains have been laid down more carefully, and under better supervision, the leakage is very much reduced. With regard to the Nottingham Company, which is a very well regulated company, the leakage has been stated by the engineer of that company to have been reduced nearly as much as 10 per cent. In Halifax, and many other places, the leakage has been reduced from, as it was at one time, 20 or 25 per cent., down to 10 per cent.

1488. *Chairman.*] Do I understand you to say that no witness can give evidence of the saving of leakage by the use of subways?—I did not exactly say so.

1489. That there is a saving; but no witness can tell what the amount is?—I do not think you can precisely arrive at it. It is merely a matter of judgment and common understanding.

1490. There will be a saving, but no person can tell what it is?—I do not think anybody can.

1491. Mr. *Powell.*] You have no means of measuring it?—No.

1492. Mr. *Wilkinson.*] The only means of ascertaining that, would be by measurements made by the company themselves, at their own gasworks?—After the gas leaves the works, it is impossible to estimate where the leakage is.

1493. Therefore, it would be impossible for anybody, except some persons from the gasworks themselves, to give distinct evidence of the amount of saving in leakage?—It would.

1494. And with regard to the company themselves, or, indeed, with regard to anybody, it would be impossible, as I understand you, to distribute the loss arising from leakage?—It would be quite impossible to do it with perfect precision.

1495. But it is within your knowledge under the old system, that there is a very heavy loss resulting from leakage, and that the road is saturated with gas, in the neighbourhood where the leakage occurs?—That is very often so; but the most fertile source of leakage, in my opinion, is at the junction between the services and the mains.

1496. Have you been at all concerned in the question of rating of gas companies?—I have.

1497. Are you aware that 15 per cent. is allowed in those cases for leakage?—I believe more than 15 per cent. has been very often claimed by gas companies.

1498. Are you aware that this has been allowed?—I cannot call to mind any particular instance where that has been allowed.

1499. Can you state any particular amount which has not only been claimed but allowed?—I do not remember any specific case; I know it is customary to allow a large amount for leakage, and that 15 per cent. has been claimed for leakage.

1500. I understood you to say that you had no difficulty whatever in accommodating the size of the subway to any number of pipes which may be required?—Certainly not.

1501. *Chairman.*] Have you any knowledge of what it cost the companies to lay

lay the pipes in your subways?—I have no knowledge of that at all; that is only within the knowledge of the gas company. Mr *M. O. Tarbotton.*

1502. You have no means of knowing what it cost them for laying their pipes in subways?—No. 10 May 1864.

1503. Mr. *Powell.*] Is either gas or water in Nottingham supplied by the corporation?—No, there is a separate water company, and a separate gas company.

1504. How long have the subways been made?—This subway was made at two different points; one-half or two-thirds was made up to a certain point when we were obliged to desist from our operations in consequence of not having got possession of certain property above that particular spot: at that time the gas and water pipes were laid up to where the work was complete.

1505. Have you tested the temperature of the subways by a thermometer?—I have, but I have not the results with me.

1506. Is it from experiments by the thermometer that you deduce your conclusion that the temperature is even?—It is very uniform; I have made sufficient experiments with a thermometer to give the precise results. From the experiments which I have made with a thermometer, I can state that the temperature generally is lower than that of the external atmosphere.

1507. Mr. *Floyer.*] Have the water and gas services been in full operation for 12 months?—Yes, for more than that time in the lower portion of the work.

[The Witness withdrew.

Mr. *Henry Armstrong*, sworn; Examined by Mr. *Wilkinson.*

1508. ARE you a Gas Engineer and manufacturer of gas apparatus?—Yes. Mr. *H. Armstrong.*

1509. Has your attention been directed to the danger in repairing gas lights by artificial light?—Yes.

1510. Have you, in order to obviate that danger, invented a safety lamp?—Yes.

1511. Is that one of your safety lamps which is by your side?—Yes.

1512. Will you explain the principle of that safety lamp to the Committee?—The lamp itself has no peculiarities beyond an ordinary safety lamp, only being much larger and made to give a much larger light, having the same safety which the smaller Davy lamp possesses. By the use of reflectors and a lens, we are enabled to throw the light almost to any distance in any dangerous place. The air comes down through the gauze, and presses down to the flame.

1513. *Chairman.*] Is there a gauze wire inside?—Yes.

1514. Mr. *Wilkinson.*] Is it possible with safety to introduce that lamp into gas?—Yes. I can introduce the lamp into a volume of gas, which is entirely gas, that is into a gas holder; in fact, until I extinguished the light, without danger; the principle being exactly the same as the Davy lamp, only that I have enlarged it and made it in such a manner that a workman is capable of doing any kind of work in any dangerous place.

1515. Mr. *Powell.*] Has it been tested by experience?—Yes; I have made them now for nearly 10 years, and all the gas companies are using them.

1516. Viscount *Grey de Wilton.*] Is anything like them used in fiery mines?—Yes; a similar article, a plainer thing. I have not introduced it into mines. I have more particularly supplied them to gas companies in London; and I have also sent them abroad, more particularly gas companies.

1517. Mr. *Powell.*] I presume it is oil that you burn in it?—Yes, common oil. The lamp screws out at the bottom in the ordinary way.

1518. *Chairman.*] What is the price?—Two guineas.

1519. Mr. *Wilkinson.*] How do you test the lamps?—By enclosing it in gas. I allow a very strong stream of gas to blow upon it in every direction; in fact, if I wanted to test it particularly, I should put it under a hogshead which has a taper top, and then introduce the gas until it becomes full, like a chamber having nothing but gas, and then if I have no explosion, I am sure I am perfectly safe.

1520. I presume you have given no particular consideration to the case before the Committee as far as regards the opposition?—No.

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1521. Have you seen enough to enable you to judge of the mode in which the gas pipes would require to be repaired if deposited in the sub way; do you know how it is proposed to be done?—Yes.

1522. Would, in your judgment, the use of that lamp be a sufficient safeguard against explosion when the pipes were repaired in the subway?—Yes; I would undertake to do it.

1523. You think the workmen could work with safety?—Yes.

1524. Has that been tried extensively in the gas manufactories?—It has.

1525. And by gas companies?—It is now in use very extensively in London, and has been in use many years.

1526. Can you give an instance where it has been in use?—I think it is in use in almost all the London gas-works, the three stations of the Chartered Gas-works, the Imperial Gas works, and the City of London Gas-works, and others.

1527. In fact, it is extensively used among the London companies?—Yes, all of them except one or two; I have sent them abroad, and also to different parts of England.

1528. Can you give any evidence as to the amount of leakage arising from gas mains?—I could not give you any definite information; that is a question which it is rather difficult to say anything about; we know that there is a great leakage, for I have been very much engaged in gas matters as a fitter-up of building premises; I have done a great deal for the Government.

Cross-examined by Mr. *Toulmin Smith.*

1529. Does your lamp always make that amount of smoke which we see that it does?—No, it is a question of burning; it need not have that quantity of smoke.

1530. You cannot make it consume its own smoke?—Yes, I think I could.

Cross-examined by Mr. *Holland.*

1531. Have you had any experience in the use of safety lamps in mines and other places?—Not in mines.

1532. Do you know whether they are generally approved of by the workmen in mines?—I do not think there is any opposition to them except on account of their not being able to get sufficient light.

1533. Do you not know, as a matter of fact, that the workmen have very strong objections to using them?—It is generally asserted, but I think their objections to it arise from want of light.

1534. There have been safety lamps previously to your's with a glass bottom?—Not in this form quite, but nearly so; a circular bulb of glass.

1535. Are you aware that there have been safety lamps introduced in Belgium, which had a glass bottom to show a considerable light?—Yes.

1536. My only meaning was that objections had been made by the workmen where the lamp did not give light enough?—Yes.

1537. In point of fact, are you aware that the workmen have very great objections to using them, and that they never use them if they can help it?—I do not think so from what I have heard.

1538. Are you aware that there have been several accidents in collieries, arising from the objection of the workmen to use the lamps?—I think not arising from their objection to using them, but from carelessness. In many collieries they do work by contract, and are also allowed to use candles, which they find at their own cost, instead of going to the expense of 15 *s.* or 20 *s.* for a safety lamp.

1539. Do you think that in fiery mines they are ever allowed to use candles?—I think no mine is ever considered unsafe until it has proved to be so. When an accident occurs, then every information is gleaned that can be.

1540. Do you think there would be any difficulty in making the workmen of the different companies use the safety lamp in these subways?—I think not the slightest; I think they would prefer such a lamp as that which gives a good light.

1541. Are

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1541. Are you aware of how the joints of pipes are repaired?—Yes.

1542. Are they not repaired with lead?—Yes.

1543. And with hot iron?—No.

1544. Is the lead not melted?—The lead is melted,

1545. Would there not in that process be a liability to explosion, supposing there was any escape of gas?—If the fires are taken down into the subway during the laying down of the mains, then there would be danger of course; if had an uncovered fire, it would be the same thing as uncovering the lamp.

1546. So that if they were obliged in their work to bring any fire into the subway, the use of this safety lamp would not be sufficient?—They would not at all apply; of course, it would be like carrying a light in one hand, and a safety lamp in the other.

Re-examined by the Mr. *Wilkinson.*

1547. Do you know the relative degree at which lead melts?—I can scarcely say at a moment.

1548. Do you know at what degree of heat gas will explode?—There must be a light applied, and the amount of heat necessary can scarcely be defined.

1549. With regard to the safety lamps, I understand the objection which is sometimes made on the part of the miners to use them is on account of the insufficiency of the light?—Yes.

1550. And probably on account of the expense also, is that so?—Yes; and there is a little trouble and attention required.

1551. It is probably on the same sort of principle which is the cause of my friends appearing in opposition to the subways?—Just so.

1552. Have you known that miners occasionally, in consequence of the want of sufficient light, actually make holes in the gauze to increase the light; is not that a source of danger?—Of course, then the lamp is spoiled at once.

1553. Have you any reason to believe that with such a lamp showing such a light as this, that the workmen would have any disinclination to use it in this subway, or would not use it constantly?—I think if that lamp was introduced into mines it would be adopted at once by the workmen.

1554. Viscount *Grey de Wilton.*] Would you not be able to detect, by the state of your lamp, that there was a sufficient amount of gas escaping to cause an explosion?—Yes; it requires but a very small presence of gas for an explosion to take place; the lamp would hardly indicate the presence of a small quantity.

1555. Then it would not be a safe indication?—It does not indicate the presence of danger, but it reduces the chance of danger.

1556. There is nothing in the appearance of the lamp to indicate the presence of the gas?—Not until there is a great quantity of gas present; then the flame begins to show it at once, but a small quantity of gas is quite sufficient to create an explosion.

1557. But that would not be indicated by the appearance of the lamp?—No.

[The Witness withdrew.

Joseph William Bazalgette, Esq., re-called; further Examined by Mr. *Wilkinson.*

1558. DO you produce some Returns?—Yes.

1559. Will you explain what they are?—They are the details of the cost of the Covent Garden subway, and also of the vaults on either side. I find that the cost was 2*l.* 15*s.* per foot run.

J. W. Bazalgette, Esq.

(*The Witness delivered in the Tables, which were as follows*):

J. W. Bazalgette, Esq.

10 May 1864.

May 1864.

COVENT GARDEN APPROACH.

Cost of Cellars, 865 feet run.

		£.	s.	d.
Excavation	3,134 cubic yards, at 1 *s.* 3 *d.*	195	17	6
Filling	20 ditto at 3 *d.*	–	5	–
Carting	3,117 ditto at 1 *s.* 6 *d.*	233	5	6
Concrete	740 ditto at 6 *s.*	222	–	–
Brickwork	51 rods at 11 *l.*	561	–	–
York paving over openings for house service.	164 feet superficial, at 7½ *d.*	5	2	6
Coal plates	No. 103, at 7 *s.*	36	1	–
Labour on York paving for ditto	No. 103, at 2 *s.* 6 *d.*	12	17	6
		1,266	9	–

1,267 ÷ 865 = £. 1. 9 *s.* 3 *d.* per foot run of frontage.

Returned as 30 *s.* per foot run.

May 1864.

COVENT GARDEN APPROACH.

Cost of Subway and Side Passages:—Length, 320¼ feet.

		£.	s.	d.
Excavation	2,010 cubic yards, at 1 *s.* 3 *d.*	125	12	6
Filling	210 ditto at 3 *d.*	2	12	6
Carting	1,800 ditto at 1 *s.* 6 *d.*	135	–	–
Concrete	470 ditto at 6 *s.*	141	–	–
Brickwork	3,483 rods, at 11 *l.*	383	2	7
Gravelling	198 cubic yards, at 4 *s.* 6 *d.*	44	11	–
Rolling	Labour only	1	–	–
Ventilating grates		15	–	–
Rake out and point brickwork	486 yards superficial, at 1 *s.* 4 *d.*	32	8	–
		880	6	7

881 ÷ 320¼ = £. 2. 15 *s.* per foot run.

Cross-examined by Mr. *Toulmin Smith.*

1560. You have given us the cost of the Covent Garden subway?—Yes.

1561. Is the price for the subway in Southwark-street the same?—I am having the price of the Southwark subway worked out.

1562. Will you be kind enough to hand it in to-morrow?—I will.

1563. You state that the price of the vaults was returned at 30 *s.* per foot run?—Yes.

1564. How can you explain the account which I have in my hands, which brings out the expense of the vaults in the subway at 10 *l.* 18 *s.* per foot?—What you are referring to is the Report of the superintending architect. I do not see how it is worked out at 10 *l.* per foot.

1565. In order not to take up the time of the Committee, perhaps you will explain that at your leisure?—The figures showing that it works out at 10 *l.* per foot are in pencil by somebody else. I should like to have an opportunity of examining them, and then I can explain the difference. *J. W. Bazalgette, Esq.* 10 May 1864.

1566. Mr. *Powell.*] You have no excavation for the subway in the Thames Embankment?—No.

1567. Do you have to go to much expense in bringing the materials to fill up?—No; we have made arrangements for filling in the embankment by taking the materials from the conservators at cost price; but parties are ready to take materials there to fill in on being allowed to shoot them.

[The Witness withdrew.

[Adjourned till To-morrow, at Twelve o'clock.

Mercurii, 11° *die Maii*, 1864.

MEMBERS PRESENT.

Mr. Floyer.	Mr. Powell.
Sir Baldwin Leighton.	Viscount Grey de Wilton.
Mr. Du Pré.	

SIR BALDWIN LEIGHTON, BART., IN THE CHAIR.

Mr. *Phinn*, in answer to a question put yesterday by the Committee, stated that the Promoters were prepared to come to Parliament, if necessary, for power to enlarge the subways already constructed. That with reference to the subways which they had already power to construct, but which were not yet constructed, they were prepared to ask for requisitions from the gas and water companies as to the extent of subways they would require, and that they would be ready to give such enlargement of the subways as might be necessary, but they hoped that Parliament would not impose upon them the obligation to enlarge the subways; and that in the event of any future application to Parliament for subways, they would take care that the dimensions of the subways should be such as would meet all the requirements of the gas and water companies.

Joseph William Bazalgette, Esq., re-called; Examined by Mr. *Phinn*.

1568. MR. HEMAN'S answer to Question 1267 is said to be ambiguous. Is there, in point of fact, in Covent Garden, exclusive of the subway, any pipe laid down?—No. *J. W. Bazalgette, Esq.* 11 May 1864.

1569. In the subway, as we know, there is one water pipe belonging to the New River Company, and two gas pipes belonging to the Equitable Gas Company?—Yes.

1570. Are there any pipes in that Southwark street at all other than in the subway?—No.

1571. In the subways are there two pipes to supply the lamps?—Yes.

Cross-examined by Mr. *Richards*.

1572. Is the proposition of this Bill that, if subways are introduced into the existing streets, the pipes at present in the existing street shall be removed into the

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subways at the expense of the companies?—I think that the Bill seeks power to require the companies to remove them.

1573. At their own expense?—Yes.

1574. Whatever pipes may be in the existing streets, if subways are constructed, the companies are to remove them at their own expense?—Yes; I think that the Bill would give the Board of Works power to make the companies do so at their own expense.

Cross-examined by Mr. *Toulmin Smith*.

1575. Although there are no pipes in these new streets, still the new streets cross the old streets in which there are pipes?—Yes.

1576. In order to make those pipes available, it will be necessary, if it is a street of any size, that those old pipes should be connected with the new mains that are laid down in the subways, will it not?—I think not.

1577. That would not be necessary?—I think not.

1578. In the streets at the Mansion House, which are large streets, would it not become necessary to do so?—I think not.

1579. You can go the whole length?—Yes, with the existing mains.

1580. Without any connexion with the new mains?—I do not think it would be necessary that there should be a connexion with the existing mains running across the streets above the subways; but if it should, in any particular case, be necessary, I see no difficulty in doing it.

1581. There is no difficulty in its being done, but in order to do it you would have to have special pipes cast, in order to carry the mains from one level which now exists in the street to a lower level in the subways?—The ordinary castings would do.

1582. The levels are very different, are they not?—It does not matter whether the pipe is to be laid horizontally or perpendicularly.

1583. It is not usual to lay pipes perpendicularly, is it?—The gas pipes in houses are all laid perpendicularly.

1584. But the mains are not?—There is no objection that I can see to it.

1585. You were spoken to yesterday about the accounts, have you made them out?—Yes.

1586. *Chairman.*] Those are the Southwark-street accounts?—Yes; the report which is put into my hand shows that an estimate of the cost of Southwark-street was made in the year 1857; six years afterwards the actual cost is ascertained, and it exceeds the estimated cost by 37,627 *l.*

1587. Mr. *Toulmin Smith.*] That 37,000*l.* is for the cost of the subways?—To that excess there is a note, "Excess of actual over estimated expenditure caused by the formation of subways not originally contemplated, and building of vaults." That note should be, "Excess of actual over estimated expenditure caused, amongst other things, by the formation of the subways not originally contemplated, and building of vaults." There is a great rise in the value of bricks and other things to make up that amount.

1588. According to that calculation, if that note were strictly correct, the cost would be 10*l.* per foot?—Yes.

1589. According to your addition, both for the subways and walls, it only amounts to 5*l.*, which is just half?—It amounts altogether to about 8*l.*

1590. I thought you said yesterday that the subways were 2*l.* 15*s.* per foot?—I only detailed yesterday the Covent Garden subway, which was 2*l.* 15*s.* per foot; the Southwark-street subways come to a little more; the brickwork is of a more expensive character, and it is rather a wider street, and therefore the galleries are rather larger; the cost of that works out at 3*l.* 12*s.* 6*d.* per foot; Covent Garden was 2*l.* 15*s.*, and the Southwark and the Westminster communication is 3*l.* 12*s.* 6*d.* I put it in my original statement at 3*l.* a foot on the average.

1591. I think you said yesterday distinctly that the vaults on each side amounted to 30*s.* a foot run on each frontage?—Yes; in the Southwark-street it does not come to quite so much; it is 2*l.* there.

1592. You can put in a statement of the Southwark-street?—I have not the detail of the vaults now, but I shall have them in an hour; I can put in a detail of the subways.

[*The Witness handed in the following Paper:*]

"SOUTHWARK AND WESTMINSTER COMMUNICATION.

Cost of Subways and Side Passages.

		£.
Excavation	21,078 cubic yards, at 2 *s.* 6 *d.*	2,634
Filling	3,186 ditto at 4 *d.*	53
Carting	17,892 ditto at 1 *s.* 6 *d.*	1,342
Brickwork	353 rods, at 17 *l.*	6,001
Concrete	4,848 cubic yards, at 7 *s.*	1,571
Gravelling	1,135 ditto at 4 *s.* 6 *d.*	255
Ventilating Grates, and Sundries		73
	£.	11,929

£. 11,929 / 3,292 feet run } = £. 3. 12. 6. per foot run.

Cost of Subway and Side Passages, average over entire length of street."

1593. Your *inter alia* must be a considerable sum?—No; it is very small indeed.

1594. If the whole is 10*l.* odd, all you can make of the two is less than 6*l.* per foot?—Yes; then it would amount to this, that the estimate made in 1857 is exceeded six years afterwards, when there is a difference of something under 2 per cent. in the cost. I think if engineers can make their estimates as near as that, there is no fault to be found. The difference is remarkably small. I think that I should point out to the Committee that, although there is an increase over the estimate, of something under 2 per cent. in the cost of constructing the street, the returns were under-estimated; and, therefore, the net cost of the Southwark street is something like 30,000 *l.* below the estimate, that is to say, the costs of the works was rather exceeded; but the returns were also exceeded, leaving a balance in favour of the Board of Works.

1594.* I suppose you have some hand in drawing up the reports of the Metropolitan Board of Works?—I draw up my own reports.

1595. There are three lines in the 11th page of the report just presented to the House of Commons, which I do not understand. I find it stated "It is satisfactory for the Board to be enabled to state that, from the rentals obtained for the plots already let, they confidently anticipate that the actual cost will closely approximate to the estimated cost." It seems to me, at any rate, that they are charging these gentlemen who are taking leases with the cost of these subways, in the rentals which they have obtained?—Not the cost of the subways.

1596. Will you look at the top of the page; that looks as if you were already getting it from these people who are taking leases, and that you are now coming to Parliament to get it a second time over?—We are getting the value of the ground we sell.

1597. If you read on, you will see there is the cost of these works mentioned?—Yes, there is the whole cost. There is the cost of forming the street, and the estimate for the land.

1598. *Chairman.*] You get as much as you can for your leases, I suppose?—The value of land has increased, and is increasing.

1599. Mr. *Toulmin Smith.*] To cover the cost of the subways, you want now to get it out of us a second time over?—No, the persons who take the land from us pay for the value of the frontage which they get; they do not know anything about the subways at all.

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1600. That is not what you reported to the House of Commons, is it?—I think so.

1601. *Chairman.*] If they are to pay 1,000 *l.* for the subways and vaults, they will pay less for the leasehold?—I apprehend, whether there is a subway or not, they would pay the same amount; the land is of the same value to them. It is a bargain according to the marketable value of the land.

1602. Viscount *Grey de Wilton.*] You were mentioning that the brickwork in the Southwark-street subway was of a more expensive character than that in Covent Garden, and that was evident to the Committee; why is that found necessary in the subway?—There was a difficulty in obtaining stock bricks; there was so large a demand for bricks during the time of its construction that we could not obtain stock bricks, and we were obliged to obtain other bricks at an increased cost.

1603. Do you think it is likely that you will generally in the subways have to use such expensive bricks?—I think not. For the last three or four years, from the main drainage works and different railways being constructed, coupled with the wet season, when they could not make bricks, there has been a rise in the brick market, which has obliged us to go to every source we could to obtain them.

1604. *Chairman.*] What is the difference between stock bricks and the bricks you use?—Ten shillings per 1,000.

1605. What difference would that make in the whole length?—It would make a difference of 1,200 *l.* in the whole cost of that subway.

1606. Viscount *Grey de Wilton.*] Are there only two prices, the stock bricks and the superior kind?—There are a variety of prices. In the Covent Garden subway we have used what are called picked stocks, which is a hard brick, though a rough, coarse looking brick; but we could not get a good picked stock because there was such a demand for them, and we therefore substituted gault bricks for the others.

1607. *Chairman.*] What was the price of bricks in the Southwark subway?—It was 17 *l.* a rod, and the price of bricks two guineas a thousand.

Re-examined by Mr. *Phinn.*

1608. I believe that you have given in the figures of the total cost to the public of the construction of the Covent Garden and Southwark-street approaches?—Yes.

1609. The only sum I see that you have got to put to the credit side, as received from the public, is 5,323 *l.* in Southwark-street, as received from sale and rents of property, and in Covent Garden-street it is 1,672 *l.*?—The rents of property is 1,672 *l.*

1610. Does that represent the ground-rents of the property which you have hitherto disposed of?—Yes, it does.

1611. That is the general report of the Board for this year, under their Act of Parliament?—Yes.

1612. Will you look at the Southwark account; do you see there "Leases and rents of property"?—Yes; 5,323 *l.*

1613. Does that represent sales and ground-rents, or ground-rents only?—Sales and rents.

1614. Then we cannot capitalize that 5,000 *l.* as annual income?—No.

1615. Do you know what proportion the rents bear to the sale?

Chairman.] This has nothing to do with the subways.

1616. Mr. *Phinn.*] Have the Board of Works been at all repaid their expenditure. Is not there a great balance against the public as regards the construction of those streets?—Yes, clearly.

1617. Mr. *Powell.*] Do you consider that the upward tendency of the prices for materials and labour employed in the construction of subways will continue, or that it has reached its maximum?—I do not consider that it will continue; the manufacture of bricks has largely increased, and the supply will fully meet the demand; and I should anticipate, therefore, a decrease in the prices rather than an increase.

1618. Do you think that the price of labour will continue to increase?—I should

should think not; labour is very high still; labour and bricks are high at the present time, but I should not anticipate any further increase; I think that those things adjust themselves, and that the price has reached its maximum. *J. W. Bazalgette, Esq.* 11 May 1864.

[The Witness withdrew.

Mr. *Robert Jones,* sworn; Examined by Mr. *Phinn.*

Mr. *Robert Jones.*

1619. I BELIEVE that you are Engineer to the Commercial Gas Company?—I am.

1620. Do you attend here under an order of the House?—I do.

1621. I believe that your company do not petition against this Bill?—They do not.

1622. Where is your district?—In the east it commences at Aldgate, and goes down as far as Barking Bridge, Old Ford, Bow, Bromley, and Poplar.

1623. Can you give the Committee some practical proofs of the expense of laying mains?—I have not come so prepared.

1624. Have you considered the proposal of these subways with regard to gas pipes?—Yes; I advised the Commercial Board not to oppose the making of subways, and not to oppose the Bill.

1625. Do you, in point of fact, as a practical man, think that the subways will be good places to lay gas pipes in?—I do.

1626. Are you connected with any other gas company beside the Commercial?—Yes.

1627. Which is that?—I am consulting engineer to the London and several other companies.

1628. You find practically, do not you, that the one great difficulty is the inspection of the pipes after laying them down?—I find there are causes over which the companies have no control. When the mains are laid in the street there are heavy weights going over them, which causes a great deal of disturbance.

1629. And a great deal of leakage?—Of course a good deal of leakage follows.

1630. Do you think that the facility of inspection during the progress of the work, and after the tradesman has completed his work, a very valuable thing indeed?—I think so.

1631. With regard to leakage, what is the ordinary pressure at four o'clock in the afternoon on a foggy day?—It depends entirely upon the size of the distributing pipes; if they are large, the pressure is not so great, but, generally, in London, it ranges from two and a-half to four inches.

1632. That would be the average?—Yes.

1633. Would that be at the remotest part of the district?—It would be much less at the remotest part; I speak of the trunk mains near to the works.

1634. What would it be at the remoter part of the district?—From an inch and a quarter to an inch and a half.

1635. That pressure, I suppose, represents very little strain on the iron pipes themselves?—It is not a destructive pressure.

1636. Is that equivalent to a pressure of about six inches of water to the inch?—I am speaking of a column of water; the maximum pressure would be four inches; I know of none higher than that.

1637. A pressure of four inches of water on an inch would not affect iron very much?—No.

1638. Then I come to the question of the joints?—Yes.

1639. The leakage would be at the joints?—Yes.

1640. Can you tell me what is the average leakage in the mains?—It ranges, in London, from about 10 per cent. to 20 or 25 per cent.

1641. When you get a maximum leakage of 25 per cent., do you represent that as arising, that is to say, from bad workmanship, from preventable or non-preventable causes?—From a variety of causes; I think that most of them are preventable causes.

1642. Supposing that the greatest care was used, and the greatest facility of inspection was obtained, to what extent do you think you could reduce the escape of gas?—That would be attributable to more than one cause. In distributing

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gas, the lower the pressure at which the gas is delivered, the less leakage it causes. The leakage is due to pressure.

1643. But pressure is an element in the leakage?—Yes.

1644. But giving the necessary pressure, how far do you think you could reduce the average escape if you had proper means of inspecting the work in its progress, and inspecting it after completion?—There is no doubt that a great escape arises from the leakage of the joints, and from the service pipes, which are of thinner metal and are liable to decay, and are decayed in many instances; but we do not discover the leakage until a great escape of gas has taken place.

1645. Supposing you had a district all subways, and therefore you had the facility of inspection while the workman was doing his work, and after completion, do you think you could reduce the average leakage by that?—There is no doubt at all that we could.

1646. Twenty-five per cent. is the maximum, ranging down to 10 per cent. minimum; how far do you think you could reduce the average leakage?—I am not prepared to say, but very considerably; there is a certain amount that we do not recover due to compensation.

1647. Is it not the fact that in your own gas works, round these great retorts, and so on, your gas pipes are continually exposed; they are not underground, are they?—That is so.

1648. Is it not the fact, that in traversing the great bridges of this Metropolis, and various places about the railway stations, the gas pipes are exposed?—Yes, some of them.

1649. Do you find that in those exposed situations you have the facility of inspection which you would desire in a subway?—Yes.

1650. And you can detect at once any escape?—Yes; I may say that, practically, the pipes in our works are subject to very great internal pressure; they are borne upon chains, or brick pillars, or brackets, and we never have an escape at all. I cannot recollect one escape for the last ten years since I have been engineer.

1651. I remember that in the report which was read the other day, it was suggested that great precautions were necessary in and about the gas works themselves, in consequence of a possible explosion of gas?—We never have explosion of gas about the works, unless we are making some alterations; and, generally speaking, those accidents are from gross carelessness. We have no escape from the mains that connect our various machineries. That has been my experience for many years.

1652. With regard to your workmen about the works, do they use any particular form of lamps, or anything for the purpose of preventing danger?—No.

1653. Do they use open candles?—We generally do that description of work in the day time.

1654. But at night, if a man is to go about the gas works, what does he use?—We do not use any safety lamps, or anything of that kind.

1655. Without going into particulars, I will ask you, are you in favour of these subways?—I am.

Cross-examined by Mr. *Richards.*

1656. The Commercial Gas Company, I understand, light Barking Bridge, Bow, Bromley, Poplar, and that district?—Yes.

1657. There is no probability of there being any subways there?—I do not know.

1658. Do you think it likely?—I have not the foresight to see what improvements may take place in those parts.

1659. It is not a very likely place to be chosen, is it?—I cannot tell, I am sure.

1660. If there are no subways there, the Commercial Company will not be affected by this Bill?—Precisely.

1661. About the leakage; you state that the leakage of London may be taken to vary from 10 to 25 per cent?—Yes.

1662. Do you mean by the word "leakage" what is ordinarily meant, namely, all the unaccounted-for gas?—Yes.

1663. That

1663. That is to say, the difference between the gas that you ought to produce from the coals you carbonize and the gas you are actually paid for?—The gas we really do produce, and the gas paid for.

1664. The gas you actually do produce, and the gas you are paid for?—Yes.

1665. And of course that includes all gas burnt upon the premises of the gas works, and any other gas that may be burnt elsewhere, and not paid for?—I have taken into account all the gas that I burn in my own house.

1666. You do not put any leakage down at 25 per cent., if you make that allowance?—I do not put down that quantity of gas which is consumed upon the premises as leakage.

1667. What is your own leakage?—About 10 per cent.

1668. Whose leakage is the 25, which you have struck your average at?—In the case of the Commercial works, it was 38 per cent. at one time.

1669. That was before you came, I suppose?—No, in my time.

1670. Do you know any other company as high as 25 per cent., or anything like it?—Yes, I think so.

1671. Which company?—Several of the companies in London.

1672. Name one?—I prefer not naming them.

1673. Do not you know that in all those which you have put as high as 20 or 25 per cent., the unaccounted for gas is included in what you call "leakage"?—They call leakage what they cannot account for.

1674. Although you use the term leakage, it does not mean only that which oozes through the joints of the pipes?—I should say that 80 per cent. of it was that.

1675. It would include any gas that goes through the meter unmeasured; would that come under the same head?—If a meter is not registering the gas we compute that and take it into account.

1676. That is when you find out that a meter is incorrect?—Yes.

1677. With regard to the pressure. Of course, I need hardly ask you whether the pressure varies very much with the level?—Yes.

1678. That is to say, the pressure at Hampstead would be very different from the pressure in the lower parts of the town, starting from the same works?—If not controlled, it would be so.

1679. Gas, for every 100 feet, exhibits an additional pressure for every perpendicular inch it rises?—Yes.

1680. You gave your opinion that the leakage, and so on, would be reduced considerably by laying the pipes in subways. Do not you apprehend that if any leakage should ultimately take place in the subways, very great danger might result from explosion?—If a serious leakage took place in the subways, of course there would be danger; but my opinion is that a main may be so laid and worked afterwards by service pipes or otherwise, that there would be no leakage at all.

1681. At the same time, you remember that service pipes are to be fixed to this main?—Yes.

1682. Do not you think, as a practical man, knowing how those things are done, and looking at the thousands and thousands of services which would be affixed to these pipes, that leakage might occasionally happen?—I think if all those thousands of services which you speak of were fixed at one time there would be a considerable escape.

1683. Supposing they were fixed from time to time?—Supposing they were fixed from time to time the leakage would be very trifling indeed, and I believe that they might be now inserted without any leakage at all.

1684. If the pipes are removed from their present position in the sewer, and put into subways, the connexion of the different services must be made about the same time. You would have 1,500 or 2,000 services to be transferred from the existing mains to the new mains in the subways?—Am I to understand that you are to have a new main laid in the subway filled with gas, and that you then will have to transfer all the services from the houses and the shops of that street on to the main at once, whilst so filled with gas?

1685. A great many of them must be filled with gas. Those that are first transferred would expect to be supplied with gas, and those that were subsequently transferred would be transferred at the time they were filled with gas; would not some leakage happen at that time?—Yes; but I am quite sure that

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if the work were carefully seen to, the escape would be so trifling that it would not be so dangerous as you seem to think.

1686. That is a matter of speculation?—It is a matter of practical experience.

1687. Explosions do happen now?—Yes, and unfortunately too often happen.

1688. And not always by the laying on of the services?—Not always; I only know one instance of explosion from the lying in of the services.

1689. If an explosion did take place in the subway of this sort, it is obvious that it might be attended with most serious consequences?—It would depend very much as to whether it was a well ventilated subway or not. I am assuming all the time that the subway should be a properly ventilated subway, and then, I think, there would be no danger whatever.

1690. Do you conceive that the subways you have seen are properly ventilated?—I have not been down into the subways yet; I have simply seen a drawing.

1691. You have not even seen a subway?—I have not, but I have seen the drawings and the reports of the subways, and I have formed my judgment upon that

1692. Do not you know that explosions take place in your own yard amongst your own workmen?—Yes, I have known explosions taking place in our own yard.

1693. Is that in the connecting mains?—In cutting out pipes where there has been a very heavy pressure upon the pipes, and I must say that there has been a very great amount of carelessness.

1694. But at the same time you, as the engineer, took every reasonable precaution to prevent it?—I did not happen to be there.

1695. The persons under you took such precautions as men generally do take to prevent explosions, I suppose?—I suppose so.

1696. But carelessness did intervene in the Commercial Works, and explosions took place?—Yes.

1697. Where those explosions have taken place, have they not been in the open air, and not in a confined place like the subways?—No, there cannot be an explosion in the open air; I never knew or saw one.

1698. What do you think of that explosion in Holborn?—It was an explosion in the gas pipe itself; the explosive mixture was in the gas pipe.

1699. I thought it was a combustion of the atmospheric air with the gas that caused the explosion?—Yes, but it was in the pipe itself.

1700. Should you put down in the subways two gas mains or one gas main with services ramifying through it?—It would depend entirely upon the neighbourhood that I was going to supply with gas; if it was a trunk main leading to a district in the subway, I should put down one main, that is, if it was not supplying the houses which it passed.

1701. But supposing that it was supplying the houses?—Then I would put down one on each side; I could equally do the same thing by one main in the subway.

1702. With the service pipes branching out?—Yes, on each side.

Cross-examined by Mr. *Toulmin Smith.*

1703. Can you tell me whether the working of your gas pipes would be much affected by a sudden change in the levels?—Only to the extent of the fall or rise.

1704. Does not that expose them to the liability of getting waterlogged at the ends?—I must tell you that in our systems of mains we have rises and falls, and some of them very rapid; but there is a provision made, which is the box syphon, which receives the condensed matter, and we pump out the condensed matter by an ordinary pump.

1705. But in the bends which you have, you are desirous to have them as little sudden as you can?—Yes.

1706. I suppose it would not be an advantage, by any means, to go from a level of two feet from the surface of the street down into the subway oftener than you could help?—No.

1707. You

1707. You would have a box syphon in the subways at each of the lowest points?—That is a mechanical arrangement that may be got over, not simply by a box syphon, in the way we use them, but by having something attached to the mains that would contain a certain quantity of condensed matter.

1708. I understand that that can be got over by contrivances, but it would cost money?—They are not what we call difficult; they are castings which we sometimes use in the streets.

1709. That would all add to the expenses to which the gas companies would be put who are liable to that mode of laying down pipes?—No, I think not.

1710. You have spoken of leakage, that occurs chiefly in the service pipes, I think?—The leakage, I think, of the pipes, is principally from the services.

1711. There is leakage, however, through faulty meters, is there not?—If a meter is perforated there is leakage through the perforation, but there is not leakage where a meter is not registering; when a meter is found not to be registering, we compute the quantity according to the corresponding quarter, so that that comes into account.

1712. You admit that leakage does take place sometimes from the meter?—Yes; but that is very trifling and also very seldom, for when it does take place, the meters being placed in cellars of houses and under counters in shops, the slightest escape of gas becomes offensive, and we get information of it immediately, before there is any considerable escape.

1713. There is a proposition before the Committee, and several witnesses have thrown out a suggestion, that the meters themselves should be placed in the subways; do you approve of that suggestion?—I have read that evidence, and it is one way by which the gas company, no doubt, would be able to test the quantity of gas passing into the houses.

1714. It is also one way in which more leakage would take place in the subways?—That would be so, of course.

1715. To as great an extent as it does now when you smell it under the counters or in the cellars?—Yes.

1716. Who now pays for the meters; do you supply them?—The Commercial Gas Company supply meters without charge.

1717. Who pays for the service pipes, the company or the consumers?—I think, invariably, that the gas companies supply them without charge.

1718. In speaking of accidents that take place through leakage, you attribute them to the want of care?—I do, 19 times out of 20.

1719. How would you propose to insure that extraordinary care in the subways which you cannot insure in your own works, that are under your own eyes?—There are a variety of means of controlling such an escape of gas. I maintain this, that in tapping the main for the service pipe, if it is in the hands of a skilful workman, the loss is comparatively small. I do not know how I should be able to name the loss, to give you an idea of it. I have heard since I have been in this room of an instrument by which a main can be tapped and a service pipe inserted without any loss of gas whatever, and I believe that to be a fact.

1720. You say so much depends upon care, and that care is to be secured by inspection?—Yes

1721. You state that in your own works, that are under much greater inspection than the subways could be, accidents have occurred?—Yes.

1722. How would you ensure, among the class of workmen who are usually employed to insert the services, and who do ordinary work, an effectual inspection of the subways at all times, so as to prevent accidents?—I must tell you that where explosions have occurred in our works, they have occurred in places where there was no ventilation, and not in the open air. I hold the same opinion now as I did when I told it to one of my friends, that the ventilation of the subways may be such, that if a large quantity of gas escapes, it would not be so large as to form an explosive mixture which would be dangerous.

1723. Still, inasmuch as all these junctions of service pipes are to be in the subway, will there not be a requisition for an extra amount of care?—I do not think so. I think myself (and I have given it a great amount of consideration) that if a main is properly laid in the subway there would be no danger. The mains, as now laid in the streets, are subject to these elements of disturbance. I have frequently seen in my experience, which is not a very short or a very small one, that in laying mains in the streets, if the workmen in advance of the pipe that is being laid get down in their trench a foot or 18 inches deeper than the level

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level they ought to keep, they put a shovelfull or two of loose earth to make up the deficiency, and the heavy pipe is put upon that loose earth; that may be continued for 100 yards, or for whatever length they have opened the ground lower than they ought to do. The joints are made after that, and there is a quantity of soil put into the trench two feet deep, and the men go over it with heavy rammers, the pavement is put over that, and is again gone over with heavy rammers, and after that comes the weight of the traffic passing over. All that compresses the loose soil under the pipe, and as the pipe goes down, the joints are drawn, and leakage is the consequence of that. Then, I can conceive a subway with a solid bottom, and a main laid upon chairs or brick vaults, properly laid; and then I can conceive that which is the fact in my own works, that with a main so laid, with joints properly made, there would be no leakage at all.

1724. What way do you propose to lay pipes in the subways; on chairs?—Chairs or brick vaults. I take it that the bottom of the subway is perfectly hard and solid.

1725. You assume that?—I take it that it must be so from the construction of the subway; then, I say, that with a main laid carefully upon that, as it is in our works, where they are similarly laid, it would be impossible to have an escape.

Re-examined by Mr. *Phinn.*

1726. You spoke about leakage; I suppose that in leakage you include robbery?—Yes.

1727. Which is not unfrequent?—Just so.

1728. Do you find that in your districts?—Yes, very frequently indeed.

1729. I think it has been suggested to the Committee that the robbery is done by running a pipe short of the meter, and then carrying it beyond the meter?—Yes, what is called a "jerry."

1730. You think that as we shall be able to see the point of departure from each service pipe to each house, we shall be able to detect the wrong done to us?—Yes.

1731. You think that that would be a valuable thing?—Yes.

1732. With regard to explosion, we know that gas requires a certain amount of per-centage of air to render it explosive?—Yes.

1733. What per-cent should you say?—From 800 to 900 per cent; 10 pounds of air to one pound of gas.

1734. When it passes that limit, and you get 1,300 or 1,400 feet per cent. of air to one of gas, it is not explosive?—It becomes less explosive and less destructive.

1735. As it is more reduced it is less explosive?—Yes.

1736. Do you think, in a case of explosion of gas in the subway, it may be so ventilated as to give an amount of air that will render the gas in ordinary cases inexplosive?—Yes, I think so. I have not gone particularly into that; but my opinion, from what I have read and from the drawings I have seen of the subways, is, that it is quite practicable to lay a gas main there, and to use it for the purposes of the gas company, without any fear of danger; those are the views which I expressed to my Board.

1737. My learned friend has rather confounded the old streets with the new ones. The proposal is, at present, to make the companies come into the new subways and new streets; that, of course, if they laid new pipes, would not enhance their expenses but rather diminish them, would it not?—Yes, I think so.

1738. Then, if we get powers to construct the subways in the old streets, different considerations of course arise?—Yes. I may say I am here perforce. Those are the views which I have given to you as an engineer. I see no difficulty or danger in laying a main in the way proposed. At the same time I do entertain views about your forcing gas companies into the subways; that, I think, is a power you should scarcely have.

1739. *Chairman.*] What is the mileage of the Commercial Gas Company?—I can scarcely tell you, but it is over 200 miles I think.

1740. How many thousand feet of gas do you send out?—We send out over 700,000,000 per annum.

1741. What is that in money?—Our rental is 125,000 *l.* I think. I am speaking now much out of book, but I think it is over 120,000 *l.* The difference

ence between what we sent out and what we sold last year was 10½ or 11 per cent.

1742. How much leakage was there in the course of the year?—That was our loss, or unaccounted for gas.

1743. Not including what you used yourself?—No.

1744. That would be 12,000 *l.*?—It would be 12,000 *l.*; but we call the gas we lose by leakage manufactured gas; it would be about 7,000 *l.* to 8,000 *l.*, I believe.

1745. Mr. *Floyer.*] You cannot say whether the ventilation in the present subways is such as to prevent the possibility of explosions taking place in the event of the escape of gas?—The only thing that struck me in the subways is that the ventilators are so far apart; I think that they might be increased with advantage; there might be more of them.

1746. What distance apart are you speaking of?—I believe they are something over 40 or 50 feet apart; I think they ought to be about 20 feet apart, which would make it a safer place to lay the gas pipes.

1747. You think that if they were 20 feet apart it would ensure a higher degree of safety?—Yes, quite so.

1748. *Chairman.*] It is 7,000 *l.* or 8,000 *l.* that you lose upon 200 miles of gas pipes?—Yes.

1749. That would be about 40 *l.* a mile?—Yes, it would be, taken that way. You understand that I am now speaking, as regards those things, off book; but it is approximate what I am now telling you.

1750. How much of that do you put down to preventable leakage, supposing that your pipes were exposed?—The learned Counsel asked me that question, and I said I could scarcely say. I am sure that a very large amount of leakage is due to imperfect joints, and those are joints to mains that are not bedded upon a sufficiently hard bottom. The land compresses under the weight that is brought to bear upon it, and the joints draw. I think if we were in a better condition for laying the mains that we should prevent the drawing of the joints and the breaking of the pipes, and the leakage would be very considerably reduced.

1751. Is there any other cause than the actual breaking of the pipes; are frauds committed upon the companies?—We have a large amount of fraud committed upon us, but I should say from my experience in London, from the number of parties we have discovered defrauding us, that it would not amount to a quarter per cent.

1752. That is inappreciable almost?—Yes.

1753. Mr. *Powell.*] Do you think that, supposing an escape of gas were to take place from the bottom of the subways, that the gas so escaping would arise in a column to the surface of the chamber, or diffuse itself along the chamber so as to form an explosive mixture?—It rapidly diffuses itself; but with ventilation it would go off rapidly. I cannot conceive any amount of leakage from the pipes once laid in the soil. I cannot see how it is to occur.

1754. Mr. *Floyer.*] You spoke of an explosion in Holborn; do you know how near the light was applied to the pipe within which the explosion took place?—I gave evidence upon that explosion, and I believe it was caused by the hot iron of a plumber; we were laying a 12-inch main in Holborn, and we had inserted a bladder into the main, blown out to its fullest extent, which almost hermetically seals the passage of gas; then we continued to lay our pipes, and the pipes had been laid something like, perhaps, 100 or 150 yards beyond where the bladder was; from some cause or the other, the bladder had become collapsed, and the mains that were being laid, being before perfectly secured by the bladder, were then full of air; when the bladder became collapsed, the gas passed it and mixed rapidly with the air, in proportions which made it an extremely explosive mixture; a plumber was making a joint upon a water pipe close to one of the service holes of the main; he brought the red iron to the joint, and no sooner had he done so, than the gas issuing from the hole ignited, rushed back into the main, exploded the main, and blew it to atoms.

1755. Mr. *Powell.*] Is artificial light made use of now to repair pipes in trenches in the streets?—No, it is not necessary.

1756. Mr. *Phinn.*] (Through the *Committee.*) Is not your total rental 334,000 *l.*

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a year?—Our gas rental is something between 120,000 *l.* and 130,000 *l.*; we have a rental from coke, tar, and other matters, but it is not so great as you put it; our total receipts are a good deal more.

[The Witness withdrew.

Mr. *Alfred Upward*, sworn; Examined by Mr. *Phinn.*

Mr. *A. Upward.*

1757. I BELIEVE you are the Engineer of the Goswell-street and Curtain-road Station of the Chartered Gas Company?—Yes

1758. How long have you been so?—Since 1852.

1759. I believe you have invented an improvement for the purpose of connecting the services with the mains and preventing escape by such connection?—I have.

1760. Have you got it here?—It is here.

1761. Will you let us see it?—(*The Witness produced the same.*)

1762. The problem is to make a hole in the main to connect the service with the least possible escape of gas?—There is no escape of gas at all.

1763. It was at the minimum before, and now it is nothing?—Yes.

1764. Will you just show the Committee how you put the machinery into operation?—(*The Witness explained his invention on the Model to the Committee.*)

1765. Is that operation in actual use by your company?—Yes.

1766. And does it answer?—Yes.

1767. Is it capable of application to the mains in the subways?—I should say so.

1768. You think that there would be very little chance of explosion in consequence of a connection with the mains?—I have tried this under a pressure of six inches of water with a light burning over it all the time, and it did not ignite, and I shall be happy at any time to repeat the experiment.

1769. Are you using it pretty extensively?—The order of our Board is to use it.

Cross-examined by Mr. *Richards.*

1770. You would require, I should apprehend, that there should always be space enough round any pipe laid in the subway to use that instrument; such a space as it occupies now?—I can do it with less space, and if there was a main immediately over it I should simply adopt the impediment as a force to be used here by means of a different form of screw; I should take the pressure from the impediment and utilise it.

1771. What is the minimum space you would require?—I should think I might do it in half the space, or less than that.

1772. It would require 10 or 11 inches, would not it?—I could do it in less than that. I think I might do it in six inches if required.

1773. You would require two men to do it, I suppose?—One man can cut nearly a two-inch hole. This cutter is peculiarly made, and a man can do with this what he cannot do with an ordinary drill; a man has cut that hole single-handed, and it is rather a large hole for one man to bore it; it is an inch and five-eighths in diameter.

1774. *Chairman.*] How long does it take a man to cut the hole?—Eight minutes; cutting the hole and taking out the burr and tapping it.

1775. Mr. *Richards.*] You can only dispense with the services of two men when you can get an artificial purchase?—It is requisite to get a purchase to get the drill to go through the metal at all; there must be a purchase of some kind.

1776. And if there is not a purchase, such as would be supplied by the wall of the subway or the pipe of another company, there must be two men, must not there?—No, certainly not.

1777. You propose, under such circumstances, to use the pipe of another company?—If the pipe of another company was the impediment to using the drill-post I should utilise the impediment for the purposes of my drill; you can put this at any angle; upside down, or any way you please.

1778. Do you remember the explosion in Ormond-street?—Yes; many years ago.

1779. There

1779. There was a great explosion in the sewer?—I was on the spot, and a second after it occurred.

1780. That was an explosion in the sewer; how did it arise?—It arose from one of our mains, lying very near the surface, being broken in half by the traffic. It became some little way apart, and the gas found its way into the sewer; and it is supposed that a person passing by, lighting his pipe, threw the paper down, and it immediately exploded, sending up the manhole of the sewer into the air, and smashing all the glass in the neighbourhood.

1781. The mixture of gas and air came up through the ordinary grating of the sewer?—It came up through the ordinary gully of the sewer.

1782. Would the mixture of gas and air come up the ventilators of the subway?—Of course; if the subway was entirely filled with gas of the same explosive mixture it would.

1783. Supposing there was a mixture of seven or eight pounds of atmospheric air and one of gas sent up through the ventilators, what would be the effect?—If the subway was in that state, there would be an explosion.

Re-examined by Mr. *Phinn.*

1784. Do you think it likely that a pipe would be broken by traffic, if laid in a subway?—I do not.

1785. If the subway was properly ventilated, which, I suppose, the sewer is not, do not you suppose that the duration might become greater than in an ill-ventilated sewer?—Yes.

1786. Your machine has a grip on the pipe itself?—It is fixed here in the ordinary way; this will be the ordinary form (*explaining the same.*)

1787. You have a purchase on the pipe itself?—I have a purchase on the pipe in the usual way, but should I not be able to get it, and there was any impediment, I should utilise the impediment.

1788. Having that purchase, you do away with the top crank, and you work your cutter against some other substance?—Yes, against another main.

1789. Whatever afforded you an impediment would give you that purchase?—Yes.

1790. *Chairman.*] Is that an expensive machinery?—No, because there is not a single tool required besides this; the usual process is to chip the holes, and there are gouges and other different implements; I have combined all these tools in this instrument.

1791. Viscount *Grey de Wilton.*] Under ordinary circumstances, how long would it take in the old way to drill a hole in a pipe; you state that it drills in eight minutes?—About the same time.

1792. Mr. *Powell.*] Is that apparatus extensively used by companies?—It is not.

1793. Viscount *Grey de Wilton.*] How long has that been constructed?—I perfected it myself.

1794. *Chairman.*] It is quite a new invention?—Yes, this would do away entirely with the escape of gas: I have a drawing of the former patent, which I will produce if you like to see it.

1795. Viscount *Grey de Wilton.*] Have you a patent for that?—I threw up the first patent, but I have patented the improvement because it entirely does away with the escape of gas.

1796. Mr. *Richards.*] How long is it since you invented it?—This first part was invented three years ago, but the second part only last week; there is not a possibility of the slightest escape of gas taking place.

1797. Mr. *Toulmin Smith.*] It has never been practically used in a single instance?—Yes, it is in daily use.

1798. Since last week?—No; of course I should not let this be used until I secured it.

1799. Mr. *Phinn.*] The imperfect one has been tried, but the perfect one has not been tried?—No.

[The Witness withdrew.

F. J. Bramwell, Esq.

Frederick Joseph Bramwell, Esq., sworn ; Examined by Mr. *Phinn*.

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1800. YOU are a Civil and Mechanical Engineer, carrying on busines sin Great George-street ?—Yes.

1801. How long have you been in that vocation ?—About 10 or 12 years; prior to that I was engaged in manufacturing engineering from my boyhood.

1802. Are you a member of the Institution of Civil Engineers ?—Yes.

1803. And one of the council of the Institution of Mechanical Engineers ?—Yes.

1804. So that you unite the two capacities ?—Yes.

1805. Have you turned your attention a good deal to mechanical engineering; gas, and so on ?—Somewhat.

1806. I believe you have visited the subways constructed in Paris, in the Boulevard de Sébastopol, and the Place du Caroussel ?—Yes.

1807. Looking at those subways; are they well adapted for laying gas and water pipes for the towns in which they are situated. I speak for the moment of Nottingham, and of the subways in the Metropolis ?—Yes, I do.

1808. The Paris subways differ very much from those of London ?—There are important differences between those and the subways in London.

1809. You have heard the statement of the proposed advantages of laying these gas and water pipes in these subways. I do not wish to go in detail through them all with you; but I wish you to supply any points that have not been properly supplied to the Committee. In the first place, as to the original laying and the inspection ?—As to the original laying, I believe the cost would be about the same. I believe the benefit there would be the greater perfection of the original laying.

1810. With regard to the leakage which is occasioned by imperfect laying, is it now a very formidable matter ?—There is no question about it.

1811. There is nothing like sight and smell; have you had an opportunity of taking from the greatest thoroughfares in London a portion of the soil at some point below the surface ?—Yes.

1812. Have you got it here ?—Yes.

1813. Where was it taken from ?—Opposite the house, No. 50, Pall Mall.

1814. Opposite the Oxford and Cambridge Clubs ?—Yes, and I have some from opposite the house of one of the counsel in this case.

1815. At what depth was it taken, and when ?—One foot ten inches below the surface.

1816. When was it taken ?—Yesterday afternoon, after the rising of the Committee.

1817. You have got it there ?—Yes; it gives a very good notion of what is the average state of the soil in the streets of London ; I have smelt worse ; there are some other samples in the room that I did not take.

1818. Is that thoroughly impregnated with gas ?—Yes ; it is the usual foul stench one gets when the streets are open for the purpose of laying or altering pipes.

1819. Should you like to apply a lucifer match to it at this moment ?—I do not know ; certainly I would rather not try it.

1820. In your experience, is the soil of London, now under the present system of laying gas pipes, absolutely saturated with the gas ?—It is the experience of everyone who has paid attention to the streets when opened almost any where.

1821. Do you think if the system of subways is adopted that means might be devised to prevent that ?—I think so ; I believe the means are these, that in the first case the pipe would be properly laid instead of being badly laid ; in the second case, it would be screened from injury by the traffic; in the third case, being constantly open to inspection, the men who originally laid it dare not lay it badly, and if anything were done amiss in the original instance, it would be detected and cured at once. For those reasons I believe a pipe laid in a subway would be as good as a pipe laid in the open air in the manufactory.

1822. Is there not a practice among the men in laying the pipes to join them previously to lowering them into their bed ?—Yes ; that is frequently done, in order to save the trouble of making the joints in the trench; they join the two lengths together, hoping that the two pipes, when joined together and lowered in

in that way, will not get strained or injured in the joints in the operation of lowering, and you will see in specifications prohibitory clauses of that practice.

1823. Notwithstanding prohibition, the desire to save trouble is greater than fear of the detection?—I have seen it done in Stamford-street, within the last fortnight.

1824. In laying pipes in the subways, the temptation, if it occurred, could not well be done?—They could do it there as well as now, but the temptation would not occur; any one joint there would be as easily made as any other.

1825. They would hardly lower the joined pipe?—No; they would not lower it.

1826. They would join all the pipes in the subway?—It could be prevented by making the opening to the subway of such a size, that they could not get two lengths down at once.

1827. It is said that if we had subways, we could not work in them without artificial light; do you believe that is the case; you have been down them, I believe?—I have been down them; as regards a portion of them, it is the case; as regards the others, I think it would not frequently be the case.

1828. Do you think that the introduction of artificial light in the subways under proper precautions would be dangerous?—I do not think there would be any danger with a naked unprotected light: it is perfectly certain that there would be no fear of a lamp such as was exhibited here yesterday.

1829. That depends very much upon the ventilation?—Yes.

1830. And upon the admixture of a large quantity of air with any quantity of gas that may escape?—Yes; my opinion about that is this. I cannot assume the gas main breaking from any casualty that would break a main now as laid in the road; but assuming that a man were to go down with a sledge hammer and wilfully break a main; and another man stood by with a light, I can understand that under those circumstances the ventilation being overpowered and harm ensuing, but I cannot understand how it could occur under other circumstances.

1831. I believe in some cases pipes are actually shifted in the streets during the night with a great deal of light burning round them?—It is very frequently done. I recollect the case of the Great Central where, by agreement with the corporation, the mains were laid in all the principal streets between sunset and sunrise.

1832. Do you attach advantage to the rigid surface of the subways?—Yes; I thought that was involved in my answer that the pipes would be properly supported, and would not be subject to the accidents that now take place in the soil in which they are now buried.

1833. It is said in connection with that, suppose you took a case of a new street and forced the gas company to lay mains in the new subways, there may be variations of level between that and the adjoining streets, and that would be a great evil?—I heard that observation, but I am incapable of following it. I do not know what it means. Perhaps it means that the bottom of the subway is six or seven feet below the place where the pipes would otherwise be laid; but I do not know what that matters, because then there would be six or seven feet of pipe to connect one with the other.

1834. Take the old Cranbourne-street, adjoining Covent Garden-street, the mains are laid in the adjoining streets at this height?—Yes.

1835. Here is the subway, and there is a difference of three or four feet between the two levels; supposing you pass along the subway, you would come to the point of Covent Garden where the mains are above the subway; they say it is hard to bring them down to this level, and then raise them to the other level?—I know of nothing that can happen, except the accumulation of matter which occasionally accumulates in gas mains at different points; but as gas mains are provided at intervals with apparatus to receive that which does accumulate, all that it means is, that at that particular point you put that which takes the accumulation.

1836. I suppose you may run back your level so as to make it slope more gradually?—As you have these receiving contrivances, and you put them in the low places, I meant that this would be the low place in which you put the receiving contrivance, as you find done in Nottingham.

1837. You have seen that carried out in Nottingham with these practical results?—Yes.

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1838. Are there variations of level there between the new subways and the old streets adjoining?—Yes, a few feet due to the extra depth of the subway; you see the pipes at the end coming down, and see the collecting apparatus put at the bottom; the man goes into the subway and pumps it out, instead of obstructing the traffic in the streets, as is done now in pumping it out of the present pots.

1839. Another advantage of the subway, which has not been called to the attention of the Committee, would be the protection of the public from that chipping system?—Yes.

1840. You saw the patent drill, I believe?—Yes.

1841. Would that drill, if universally introduced, have the same effect in the sewer as in the trenches where they chip or use the drill, that the public would not suffer in the way they do now?—In the subways the public would not suffer. At the present time it is very commonly the practice (and a bad practice it is), that instead of a hole being drilled, the workman takes a chisel and chips it as nearly round as he can chip it, and having done that and finding that it is not quite the size or quite round, he tries to get it round by using what is called a rimer. After having tried once or twice, he gets at the right size to enter the tap, and then he taps it. This chipping causes pieces of iron to fly about in all directions, and I have heard of cases of people being injured and compensation being paid to those injured by this.

1842. I think that there was an action about a month ago?—I do not recollect it; I only know it generally.

1843. With regard to the escape of gas, you think that if a gas pipe and a water pipe were laid side by side in the subway, that the gas pipe would be in danger of being impregnated with water and the other impregnated with gas?—I do not think that there would be any danger; but this is manifest, that whatever danger there might be it must be much less than that which now exists, and for this reason, that if that jar contains a favourable sample of the soil in which the water pipe is now laid, and the water pipe can be kept in its purity at all, it is better in the subway where you can detect no smell of gas whatever. This is a jar that no one would care to have opened in this room, and the contents turned out upon a piece of paper.

1844. The pipe being buried in that soil, would, if the joints were at all leaky, affect the water in the pipes?—Whatever may be the effect in the soil, it is clear that the effect in the subway must be much less; in fact, there would be no appreciable effect.

1845. With regard to the streets that intersect the streets where the subways are laid, do you think that there would be any difficulty in adapting the system of pipes in those streets to the pipes in the subway?—Do you mean the connection between the pipes?

1846. A connection between the pipes; suppose a street runs at right angles to a subway street?—You put in the ordinary bend and a piece of pipe; there would be nothing more than the ordinary castings that I know of or can imagine.

1847. You mentioned the advantages; do you see any disadvantages, whether from explosion or otherwise, that would counterbalance the advantages we propose?—I do not; the only possible thing that I can fancy, and the only objection that can be raised, is upon the question of explosion, and, as far as that is concerned, for the reasons I have given, I believe that there never would be, or never could be, a large leak concentrated in one place, so as to overcome the means of ventilation provided; I have made experiments upon the explosive mixture of gas and air some time ago, and know what they are.

1848. We have got the fact, that gas will not explode until it has got about nine times its amount of air mixed with it?—It will begin to explode with six times its amount of air; the maximum of explosion lies between eight and 12 according to my experiments; I think the explosion terminates at about 15 to one; I speak from memory, but I can refer to particulars.

1849. There would always be somebody in the subway once or twice a day, so that the smell would be a pretty good index?—The pipes in the subway would be in the same condition as the pipes in the gas manufactory itself; that is to say, they would be in the open air, and they would be constantly visited and visitable, and any leak would be detected forthwith.

1850. These are theoretical views to some extent, because, except in the case of

of the subway of Covent Garden, we have had no practical experience?—In England we have not.

1851. As far as you have observed, does practical experience, limited as it is, confirm your theoretical views?—Yes, quite so, not only limited as it is, but badly carried out as it is; because, in the Covent Garden subway, they have wrongly put the pipes underneath the surface of the floor of the subway.

1852. You would have them on chairs, as suggested?—Yes, I think the great advantage of this is that the pipes would be visible at all times.

1853. You, in company with Mr. Hemans, went and inquired into the Paris subways?—Yes, I did.

1854. You were in communication with the engineer in chief, M. Belgrand?—Yes.

1855. And you were with his assistant, too?—Yes.

1856. I will not go into detail of what you saw, because Mr. Hemans has stated that generally, and perhaps specifically; did you trace any explosion to the practice of laying the gas pipes in the subway proper?—No.

1857. Did you find that explosions had taken place not in the subway?—Yes, in the ordinary sewer.

1858. Was it in the Rue du Marché St. Honoré?—Yes.

1859. How far was the sewer from the point where the gas leakage was?—It was close by the point where the gas had leaked.

1860. The point of explosion?—The point of explosion was close by where the gas had leaked, but the gas had leaked not from any pipe in the sewer, but a pipe outside the sewer; the statement was given to me by M. Louis, one of the subordinates of the engineer.

1861. Is that the gentleman whose name Mr. Hemans could not recollect?—Yes; I booked it at the time.

1862. *Chairman.*] Does he belong to the municipality?—Yes, to the municipality; he was one of the deputies of M. Belgrand. The statement given to me was this, that a service pipe leading from the main, being laid in the ordinary way, leading to the house No. 14 (which house is the corner of the street), had corroded from lying in the earth, and had become rotten. The men were then taking it up. There had been a serious leak, and it was that gas which so leaked, that ran into a neighbouring sewer, and was fired by a man passing the sewer entrance, the ventilation having been stopped by the superincumbent earth that the men had dug out of a trench to relay the service pipe.

1863. That was no argument against the subway?—I had nothing to do with it; it was a mere explosion of gas, and argued no more against subways than any explosion occasioned in any house or anywhere else; but as an argument in favour of subways, that appears to me to be a strong one; had the service pipe been laid in a latteral passage, instead of in damp earth, I have no hesitation in saying that the accident would not have happened.

1864. Was there not another in the Place Roubaix?—Yes, and it turned out that that was some mile and a half from the place where there was any gas pipe in the sewer at all. That again was due to a fractured or rotten pipe, and the gas leaking into the sewer.

1865. Did your subway belong to the Boulevard de Sebastopol?—Yes.

1866. I think that is open to the sewer?—Yes; it is a tunnel with a channel in the middle of it, along which channel the sewer runs.

1867. They have got water pipes, but not gas pipes there?—Those pipes are of the usual size, and are laid on tressles.

1868. How far below the level of the road?—It varies. I should say the average is about 5 ft. 6 in. I think my head was rather above the centre of the pipe. You may take it at 5 ft. 6 in. In one place it went up as high as 9 feet; but the average may be taken at 5 ft. 6 in.

1869. I believe you were shown a subway or sewer, or something between the two, in the Place de Carrousel?—Yes; I went down into it there. There was mud in the bottom of it in parts, and in other parts it was dry; but as far as I could see it was the sole sewer by which the rain got away from the Place de Carrousel.

1870. Was there a gas pipe there?—There was.

1871. Did you ascertain whether there was any gas in it?—I did not ascertain it by putting a candle or a light to it; but M. Louis said it was a gas pipe: and certainly, to the best of my recollection, I saw the service pipes from it going up to

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the street lamps. I did not for a moment suppose that I was going to be shown something as a gas pipe, which was not in fact a gas pipe.

1872. That had been in existence there for nine years?—Nine years, I was told, and there never had been the slightest difficulty or trouble of any kind or description, and alongside of it there was a water pipe.

1873. Did what you see in Paris at all shake your faith in the theory or practice which you had advocated before?—No, it did not; and for this reason, that the explosions which occurred there were explosions in sewers. They proved nothing more, than that gas is explosive when mixed with air, against the proposition of using the subways; and, to my mind, they proved in both cases this in their favour, that had the pipe been in a subway instead of in the ground, the accident could not have been caused.

Cross-examined by Mr. *Denison*.

1874. Notwithstanding all this they are not unanimously of opinion in Paris in favour of laying gas pipes in subways?—No, certainly not.

1875. You said you were connected with some gas works?—No, I beg pardon; I did not.

1876. Then I will ask you, what is your gas experience?—I have no special gas experience; it is from my general knowledge, gained in my profession as an engineer.

1877. Have you any water experience?—Not specially.

1878. When you state this cost of laying to be about the same which you have mentioned, what do you estimate to be the present cost of laying pipes per yard?—Do you mean irrespective of the iron, or including the iron?

1879. You had better say irrespective of the iron, because the iron would be common to both; but take some given size?—Take, for example, a 12-inch main, I should say that the price, irrespective of the iron, and irrespective of the repaving of the road, which is an amount paid to the parishes for repaving, would be about 3 *s.* 11 *d.* or 4 *s.* per yard, or 352 *l.* per mile.

1880. What experience or knowledge is that founded upon?—It is founded upon a matter that I had estimated for. I was engaged some few weeks ago in the establishment of some new gasworks at Birmingham, where I had to look into the prices very minutely.

1881. That was the unlucky concern that we met on in the Lords?—I do not remember meeting you there.

1882. I remember seeing you there; you were unlucky there, were you not?—Their Lordships thought that Birmingham ought not to have another gas company.

1883. *Chairman.*] That has nothing to do with your estimate?—My estimate was not in any way contested, nor was I cross-examined upon it.

1884. Mr. *Denison.*] That is as to a 12-inch main?—Yes.

1885. Mr. *Powell.*] Does that include the paving?—Not the parish paving. I am distributing it in this way. Taking it that the company, in an existing road which is already paved, take up the paving, dig the trench, lay the main, put the earth down again, and put down the paving again as well as they can do it. Then they have got to pay the parishes for the better paving of it afterwards, which I have not included.

Mr. *Denison.*] That includes all except what the parishes charge.

1886. *Chairman.*] That includes the paving, which would not be the case with a new street which had not been paved?—No.

1887. Have you got the expense for filling up?—I do not think that I or anybody else could separate it in that way; but I should say the proper price would be 1 *s.* 6 *d.* per cubic yard for taking out, refilling, and paving. Take the case of a 12-inch main. First of all, you must say for what distance you are going to lay your pipes down. Taking it at one foot six down to the bottom, it would be about 9 *d.* per yard run.

1888. Mr. *Denison.*] That is in what we may call roads, as distinguished from streets?—I was taking it as a sort of incomplete road, where there had been no surface disturbed.

1889. That is with regard to a 12-inch main?—Yes.

1890. Have

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1890. Have you any other sizes that you can give the Committee?—Shall I take a 3-inch main and an 18-inch main?

1891. It is hardly worth while taking a 3-inch main; take an 18-inch main?—An 18-inch main I should say would be from 8 *s.* to 9 *s.*

1892. For the same things?—Yes.

1893. What would a two-feet main be?—I have not worked that out; I have got the weight of it, I think; if not, I can easily give it to you.

1894. Never mind the weight, because that is only one of the elements; have you at all gone into the diving bell question?—No, I have not.

1895. I mean Mr. Bazalgette's diving bell for laying pipes?—No, I have only seen the drawing; I was not in the room at the time he gave that evidence; I only just saw the drawing for a moment, therefore I am not prepared to speak to that.

1896. You are not prepared to go into that?—Not into the specific thing shown, but I am prepared to go into the question of what could be done.

1897. I am asking you as to that specific thing?—No, I was out of the room during a great part of the time.

1898. You say that it would be easy to let down the pipes in one length?—No; what I said was this, that, at the present time, the inconvenience of making a joint in a trench was such that there were attempts to join two lengths together and to lower them as a whole into the trench. I said, that clearly could be provided against, by making such an entrance as would prevent two pipes being let down together.

1899. How do you suggest that the entrance should be made?—By side entrances, as in the existing subway.

1900. How are they made?—There is a shaft or well; from the bottom of that there is a lateral passage which leads into the main subway.

1901. They would be laid down horizontally, would they not?—I do not see why they should be.

1902. *Chairman.*] I suppose it is self-evident that a small pipe is much more easily carried and put into a subway than a long pipe?—No doubt of it; it is something like getting a small cask into a cellar as well as large casks.

1903. Mr. *Denison.*] We have large casks to deal with sometimes?—Yes, I am aware of that; I am quite sure the Board of Works will give you a door big enough to get them in at.

1904. How is it that you are contemplating that a large 3-feet pipe is to be laid down; what sized well is to be made?—I do not want to be jocular, but I say that a well may be made big enough to let down a 3-feet pipe; that is the short answer.

1905. That depends on the way it went down?—If it went down horizontally, the opening would require to be larger than the length of the pipe, and a little wider than the width.

1906. That is not the way in which you would propose it should be done?—There is no necessity for that.

1907. What is the way that you would propose?—I should propose to let it down vertically, or on a slight slope down a slide; that would be the easiest way for large pipes.

1908. Is the slide to point across the axis of the subway, or the side of it?—I should propose it to be across the axis of the subway.

1909. Where would it come out; in the pavement?—In the pavement or in a side street. A side street would be a very convenient way of doing it, as has been done in Covent Garden.

1910. A side street in which there is a subway?—No; there may be a subway, or there may not be. One of these special lateral passages, having due height and width, could be prolonged into the side street.

1911. Do you mean a side street without a subway?—If there is a subway in the side street it will not interfere with this passage; and if there is not a subway, the passage could soon be made.

1912. Is there any difficulty in turning from the corner of a subway into a side street where there is another subway?—That condition of things has not yet arisen. Supposing it did arise, I presume the engineer would take care so to round off the corners that there would be no difficulty of any kind or description.

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1913. Then we have got now to subways with rounded corners?—When that case arises that you have to join one subway at right angles to another, the difficulty will have to be met. At the present time, the subways, the subject of this Bill, have not got that.

1914. The subways, the subject of this Bill, are all in the metropolis?—I hear so much dispute about that, that I will not pretend to offer an opinion upon it.

1915. Supposing the subways go through a great many courts of the metropolis there would be right angles to encounter?—Very slightly.

1916. The vaults of the houses would come into the streets in both cases?—That drawing shows clearly the relation of the cellars to the subways.

1917. That is a very wide street, clearly, is it not?—I have heard it called a second class street.

1918. What width is it?—Seventy feet, I believe; I have seen it, and it looks like 70 feet wide.

1919. What is the width of the subway itself?—Twelve feet.

1920. And the width of the vault is how much from the houses?—That I do not know; looking at the drawing, my eye will tell me that the vaults and areas together are from 13 to 14 feet.

1921. In a street of that kind, supposing there is another subway at right angles, what is the construction of the subway to be?—The construction of a subway, assuming it to be a street of the same class or importance, would be the construction you see there, and then at the point of junction there would be such easing off of the corners as might be necessary.

1922. That is, your subway would have to be made with corners sufficiently round to carry off pipes 12 feet long and three feet wide?—With regard to that subway, there would be very little rounding required.

1923. There will be a great many pipes in that subway, will there not?—There will, or may be.

1924. That will practically define the size of it?—Yes, to the extent that it is occupied.

1925. Besides, there is to be a way for trucks to carry these pipes?—That is not anything very wide; you only want to have the width of the truck, and the pipes to go upon it.

1926. I suppose you would hardly say that that would be less than the width of the pipe itself?—Clearly not; three feet pipes are very uncommon for gas purposes. I think it is only the main of the Great Central Company, from Bow to London, which is three feet wide.

1927. We have water as well as gas to deal with; what is the size of a good sized water main?—Twenty-four to 30 inches; I have heard of a 48-inch main where it replaces the whole of the New River. They have lately filled in the whole of the New River, and they bring it through pipes instead.

1928. Then we are to take three feet as the size of a large gas pipe; are we to take from you that 30 inches is the size of a large water main?—No; do not take from me three feet as being the size of a large gas main; because the arterial pipe from Bow Common, I do not think, can be looked upon as a type of the large size gas mains in the street.

1929. What shall we take it to be?—Thirty inches.

1930. And the same for water?—Yes; I know there are some streets in which there are a large number of pipes. I believe they got there under a condition of things which Parliament has now put a stop to.

1931. You mean the competition?—I do.

1932. Although competition is put a stop to between the companies, is it necessary that they should still retain power to reach other places?—Where they have been laid as means of communication with other places; but in new streets, where no new pipes already exist, I cannot consider anything of that kind necessary.

1933. The promoters of this Bill refuse to limit it to new streets?—If a subway is made for old streets where a complication of that kind exists, it will be within the knowledge of the person making the subway what complication there is, and it will be within his knowledge what sized subway it is necessary to make, in order to provide for the pipes which are to be passed through it.

1934. He

1934. He must make it so much larger?—Yes; there will be so many people benefited by it, and therefore paying for it, that it is like a large house held by several people, and therefore capable of paying a fair rent.

1935. Have you formed any opinion about this system of paying rent for the subway?—No; I have not.

1936. I understand you to say that any case of crossing from a street which has a subway in it, to one that has not; you do not consider there is any difficulty?—I do not quite understand what you mean by the term "difficulty" in the street. The question put to me was as to a communication between a street with a subway and passages, and a street which has not a subway.

1937. You consider there is nothing in that?—I cannot find anything in it, for this simple reason, that the deflection from the straight line, to my mind, is no more difficult or injurious than a deflection which is made in a vertical direction. The point is this,—does a bend diminish the flow of water or gas through a pipe? Therefore, if you put in a number of bends, must not the flow of gas or water be diminished? Yes, it must. Then, to ascertain the value of that answer, you must find what number of these bends or elbows there are.

1938. Are you prepared to give us the value of that, or do you leave that to us?—I leave that to you.

1939. I am now going to put a question to you, which may perhaps seem ludicrous in your view of the subject. With regard to the freezing of these water pipes in this well-ventilated subway, do you think there is any risk of the water pipes being frozen?—I particularly put that question in Paris; and I was informed that they had a perfectly uniform temperature, and that throughout their subway the temperature was 52 degrees Fahrenheit; but I should at the same time state that that was the identical temperature in the open air.

1940. What is the state of ventilation in those subways?—In the subways under the Boulevard Sebastopol the ventilation is very good, but the atmosphere is not over nice, because you have got the smells from an open sewer.

1941. You think there is no fear of the water freezing in the pipes?—I think not. I am judging not from my own experience in Paris, but from my experience in Nottingham during the last severe winter.

1942. I think I understood you to say you have not gone into the question of expense much?—Do you mean the expense of the subway itself, or the cost of removal?

1943. The subway?—No. I have read the statements of the engineer, and I look upon it as a settled question.

1944. You read the engineer's statement, did you not?—Yes.

1945. According to his opinion the rent ought to be in proportion to the expense of maintenance only?—I did not quite gather that that was so; but certainly his answer tended that way. I do not pretend to remember the identical answer which was given to the question.

1946. Does that appear to you to be a fair way of viewing the thing?—No, I think the companies very fairly might be charged a greater rental than that; for this reason, that I believe the gas companies especially will find an obvious advantage in the pipes being laid in the subway, owing to the stoppage of leakage.

1947. Do you think the rental ought to be in proportion to the advantages which they obtain?—I think it is more a financial question than an engineering one; for what my opinion is worth, I think it ought.

1948. Mr. *Powell.*] Could you give the Committee any idea of the length of time pipes last when laid down in the streets?—Wrought iron service pipes are renewed every 10 or 12 years; these corrode the most rapidly. I cannot give you any answer as to cast iron service-pipes, but I know their life is considerably longer than that of wrought iron.

1949. Their life depends upon the diameter and size?—No; it will depend somewhat on the thickness of the metal, and very greatly on the circumstance of the soil, as to whether there is any corrosion from ammoniacal sources.

1950. Do you happen to know what is the diameter of the great pipe which conveys the water to Liverpool from Rivington?—I believe it is four feet.

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1951. *Chairman.*] You cannot go into any details of what the saving of cost will be to the companies by laying pipes in subways?—The original cost of laying, as I think I have stated, would be about the same. It is obvious that the digging of the trench is saved.

1952. But then there is the cost of maintenance afterwards?—Yes.

1953. Are you prepared to go into that at all?—Only to this extent, that I believe pipes when laid in a subway, I may say, are practically everlasting.

1954. I want to bring it to the question of pounds, shillings and pence, as to your opinion of what the companies ought to pay?—My opinion is, that when that point is ascertained, they ought to pay certainly to the extent they are benefited.

[The Witness withdrew.

Mr. *Phinn* stated that he had closed the case on behalf of the Promoters.

Mr. *Hope Scott* then proceeded to address the Committee on behalf of the gas companies, against the Bill.

The Committee deliberated.

The *Chairman* stated, that it was the opinion of the Committee that the learned counsel need not trouble himself with the question of the old streets, which observation did not apply to Covent Garden and Southwark subways.

Mr. *Hope Scott* presumed the Committee intended streets in which there were no subways at the present moment.

The *Chairman* replied in the affirmative.

Mr. *Hope Scott* then continued his address.

[Adjourned to To-morrow, at Twelve o'clock.

Jovis, 12° *die Maii*, 1864.

MEMBERS PRESENT:

Mr. Floyer.	Mr. Powell.
Sir Baldwin Leighton.	Viscount Grey de Wilton.
Mr. Du Pré.	

SIR BALDWIN LEIGHTON, BART., IN THE CHAIR.

Mr. *Hope Scott* continued his Address.

Mr. *William Innes*, sworn; Examined by Mr. *Richards*.

Mr. *W. Innes*.

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1955. ARE you Engineer to the Phœnix Gas Works?—I am.

1956. Those gas works, I believe, have large premises on the Surrey end of Vauxhall Bridge, and also at Bankside?—Yes. The Phœnix Gas Works are on the Surrey side of the river.

1957. I believe your works are on a very extensive scale?—They are large works.

1958. Certain plans were alluded to, and produced by my learned friend, Mr. Hope Scott, and submitted to the Committee yesterday; were those plans prepared by you?—The plan of New Bridge-street, Vauxhall, was prepared by me.

1959. Have you inspected the subway in Southwark-street?—Yes, very particularly; and, continuously, I may say from the beginning of its construction.

1960. Have you looked especially as to its capacity for accommodating the pipes which it is proposed to carry?—Yes; I have.

1961. Have you a plan of the existing state of things in that line of street?—It is a perfectly new street; there have been no pipes there; it is not a position where any street formerly existed.

1962. Is it within your lighting district?—Yes; the whole of it.

1963. Can you give us any notion of what would be the minimum number of pipes that must be immediately put down in the subways, supposing the subways to be brought into use?—For gas purposes, the minimum would be three.

1964. Of what diameter would those pipes be?—The larger conduit pipe, leading to the district, would be an 18-inch pipe; the two smaller would be 10-inch pipes, one on each side of the subway

1965. In addition to those gas pipes, would there be any water-pipes necessarily introduced?—There would be the same extent of water-pipes.

1966. Is that the plan you prepared (*handing a Plan to Witness*)?—Yes.

1967. Have you a plan there, giving some notion of what the state of things would be, supposing the pipes at present necessary were introduced in the subway?—I have a section of the subway, and the position and class of pipes necessary to supply it with gas and water.

1968. Would there, in your opinion, be, in the course of the next few years,

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any probability of your requiring to lay down additional pipes there than there is at present?—That is our experience throughout the whole of our district; that increase is necessary every five years.

1969. I observed in that plan there are a certain number of pipes running one way, and cross pipes running the other?—Yes.

1970. Will it be necessary for the purposes of your supply, in addition to pipes running longitudinally across the road, to have pipes laid in the opposite direction?—It is necessary, for the conduct of our works, that the pipes that run at right angles across the streets should remain there, and not be connected with the supply of the services; they are the conduit-pipes leading between the works and the gasholders for conveying gas from the manufacturing station to the storeage station, and they do not join the other pipes at all.

1971. Where is your storeage station?—At Wellington-street, Blackfriars-road.

1972. The pipe that conveys the gas to the storeage station seems to run right across Southwark-street; you have a manufactory on one side of Southwark-street, and the storeage station on the other side; the pipe that connects the main has no connection with the services?—An 18-inch pipe was temporarily provided by the Board of Works. (*The Witness explained the Plans to the Committee*).

1973. To what depth does the pipe descend; how much does it diminish the height of the arch?—At present, it is within two inches of the level of the surface of the brickwork.

1974. *Chairman.*] Then this is not a correct drawing?—That is what he required it to be; that is not a correct drawing of the position of the pipes at present.

1975. Mr. *Richards.*] At present, it just comes down below the arch?—To the level of the arch.

1976. Viscount *Grey de Wilton.*] Two inches above it, is it not?—Yes, the iron plate is two inches above.

1977. Mr. *Richards.*] But if you are not allowed to take up the road to put in your pipe, you must have it inside the subway?—We believe from the construction of the Bill that we shall be compelled to go to the level of the subway to conduct those pipes in the same levels as the bottom of the pipes running in Southwark-street, and we have made a sketch with that view.

1978. Looking at the number of pipes which you would require at present, and to the water pipes that you say would amount to the same number, do you consider the capacity of that subway is sufficient for the purpose?—The subway of Southwark-street would be sufficient for the longitudinal pipes, but it does not make sufficient provision for the crossing of the pipes that are unattached to the longitudinal ones.

1979. Does it make any sufficient provision for any increase of supply that you may require in the next few years, bearing also in mind the necessity for keeping a gangway open along it?—We believe not.

1980. You have got a section there, have you not?—Yes.

1981. What is that?—A section of what we should require in Vauxhall ourselves, by which we should occupy the whole of the subway.

1982. Do you consider that the means of access for heavy pipes is convenient?—As at present provided, the accesses would be unsuited altogether; there is not a sufficient space to admit a pipe of an ordinary size, nor would it be always possible to get a pipe down through the accesses and convey it to the position required.

1983. *Chairman.*] An 18-inch pipe would be 12 feet long, and a 10-inch pipe would be nine feet long?—The present apertures that admit into the subway would take a 10-inch pipe, but would not admit an 18-inch pipe without altering the form.

1984. Some of your pipes run to 12 feet?—Yes, 12 inches and 24 inches.

1985. A 24-inch pipe is 12 feet long?—Yes.

1986. And the opening to the subway would be utterly inadequate for that?—The present apertures would be inadequate.

1987. You talk of an 18-inch pipe as being actually required; what is the length of an 18-inch pipe?—Twelve feet long.

1988. Can

1988. Can you give us a notion of what the weight of one of those pipes is?—An 18-inch would be 13 cwt.

1989. And I believe a water-pipe is thicker, and would therefore be heavier?—A water-pipe would be 10 per cent. heavier, about 2¼ cwt. more.

1990. Looking to the construction of the subways, would it be possible to turn such a pipe in the subway?—Not a large pipe.

1991. And it would be still less possible when you have already pipes laid down?—It would be impracticable; at present an 18-inch pipe could not be turned in the subway in Southwark.

1992. It may be said that every pipe ought to be let down in its proper direction; but do you find it sometimes necessary to turn pipes in the process of laying them?—Yes; we find that in laying them in the streets they have to be reversed; they are not put down with the sockets lying the right way.

1993. *Chairman.*] That is, I suppose, from negligence?—It is in the mode of loading, and so forth.

1994. Why could not they be put down in a proper way?—There is no particular reason why they could not.

1995. Mr. *Richards.*] That work it is done by a contractor generally?—Yes, it is so.

1996. With reference to the ventilation of these subways; do you conceive that the ventilation of the side galleries would be sufficient for the purposes of carrying away any gas that might leak?—There is no ventilation in the side galleries.

1997. When the houses are built and completed, you mean?—At present there is no ventilation.

1998. And, therefore, when the houses are completed right and left you conceive there will be no ventilation in the subway?—Completed or not completed, there is no ventilation; there is only a dead wall.

1999. *Chairman.*] You should not be so positive upon that point, as I have seen it myself. When you answered the learned Counsel's question, I suppose you meant that there would be no ventilation when the houses are built; that, I believe, would be the case?—Yes.

2000. Mr. *Richards.*] When the houses are built and completed, do you conceive there would be sufficient ventilation in the side galleries to allow of the escape of gas, supposing leakage takes place?—I say there is no ventilation in the subways; they have dead ends; I think there can be no doubt of that, because if there was any admission from the cellars of the adjoining houses the danger would be something fearful,

2001. You are eminently a practical man upon this matter; do you conceive that it is possible for any gas company to escape a certain amount of leakage from the service pipes, or the joints of those pipes so laid down, however careful they may be?—We have never found it so in the experience we have had, even where pipes have been laid in the most exposed situations, such as the gas pipes surrounding our works, or in other open places in the coal stores.

2002. We are informed that pipes are very often laid round the building for manufacturing purposes, supported on tressels, or something of that sort, being constantly open to inspection. Do you practically find that, though they are so open to inspection, still that leakage will at times take place from the joints?—Leakage takes place more particularly after severe changes of temperature.

2003. That is to say, great heat and cold?—Yes, but cold more particularly.

2004. The pipes you are speaking of are under your constant inspection in your own yard?—A part of them; we also supply pipes over Southwark Bridge, about 1,100 feet in length; they require annual inspection after severe weather.

2005. Do you, upon making that annual inspection after severe weather, find the joints have frequently started?—We invariably find that to be the case after such weather as will freeze water; and we find that the joints of the pipes that cross Southwark Bridge have to be re-set; that is, the lead sent back into the sockets of the pipes.

2006. It is no use re-setting them until the severe weather has come to an end?—No.

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2007. And in those joints, I presume, leakage occurs?—Yes; the leakages are perceptible upon the bridge; and even at the works of the Phœnix Gas Company we find, every winter, it is necessary to set back the lead into the joints of the pipes.

2008. Do you conceive that the system of ventilation adopted in these subways would be calculated to protect pipes from the changes of temperature you have named?—The proposed ventilation (because at present, I believe, there is really no ventilation), would equalise the temperature below with that above; we should find that the cold would penetrate to the subway.

2009. Admitting, for the sake of argument, that pipes laid in a subway would be less liable to leakage than pipes laid in the soil, can you conceive that a leakage taking place in the subway would be much more severe than a leakage taking place in the open air?—Yes; I think that would be self-evident from the confined condition of the subway itself.

2010. I presume that the gas companies do their very best to prevent leakage?—We have a special interest to have as little leakage as possible; because leakage is all loss.

2111. You do, therefore, the best you can to prevent it?—Yes.

2112. But still, as a practical man, you think that it is unavoidable to some extent?—Yes.

2113. I think you were called in at that great escape in Wood-street, of the Central Gas Company?—I was consulted upon that.

2114. That was an escape in carrying a service pipe into a house?—They were in the process of attaching a service pipe.

2115. And the gas escaped into the house, communicated with the lights then burning, blew up the whole house, and cost the company 40,000 *l.*?—They compounded it at 40,000 *l.*

2116. Supposing that an explosion to take place in the subways into which the companies have been compelled to go; is it in your judgment fair and reasonable that they should pay the damage of it?—I think decidedly not; if they are compelled to go into a dangerous position, they ought to be protected from the consequences of that position.

2017. Have you heard any proposal of the Metropolitan Board of Works to meet those contingencies?—They have always evaded the question when put to them about their being liable for damage.

2018. I have confined myself to the subways now in existence; but I suppose I may ask you, whether in the leading thoroughfares there are frequently many pipes laid?—In some leading thoroughfares that the Phœnix Company supply the gas to, they have as many as nine pipes themselves.

2019. That is besides the water pipes and the telegraph pipes which may chance to be there?—Yes, and other gas companies perhaps as well.

2020. When you are speaking of 18-inch pipes and of 10-inch pipes, you are confining yourself to the immediate requirements of Southwark-street?—One portion of Southwark-street, as soon as Southwark enters Christchurch Parish, the Lambeth Company would then require to supply the pipes, which would of course necessitate another set of mains.

2021. In laying your mains in the existing subway, do you allow for laying a gas main on each side of the subway, for the service of the houses on each side of the street?—We think that it would be necessary to lay two pipes; it would be inconvenient to lay one pipe only, with the services branching right and left; indeed, I think that it would be almost impracticable.

2022. I apprehend that wherever a gas company has a large leading main running through a street, they usually have a small main for local services in addition?—Our practice is constantly to lay down a large leading pipe conveying gas to more distant localities, and what we call service mains in the footways, to which the service pipes of the houses are attached.

2023. That gives you the advantage of short services, and avoids the necessary extra pressure upon the large leading mains in consequence of the service pipes being attached?—There is another evil, and that is that the pressure on the larger main is usually a heavier pressure than upon these small mains.

2024. There is a greater pressure in the larger mains than is necessary for lighting small houses?—Yes.

2025. I presume

2025. I presume that you are familiar with the cost of laying mains, as they are at present laid?—I am.

2026. Will you tell us what the cost of laying a 12-inch pipe would be. I exclude from that the cost of the iron altogether. I mean the cost of conveying the pipe from your works to the place of deposit, opening the ground, putting the pipe into the trench, soldering its joints, and covering it up again. What do you put the cost per yard of laying a 12-inch pipe?—The cost, including what you have just now referred to, would be 3 *s.* 6 *d.* a yard.

2027. Mr. *Powell.*] That includes everything except the cost of the pipe?—That includes everything except the cost of the pipe and the cost of paving.

2028. Mr. *Richards.*] Does it include the filling in the first time?—It includes filling in and levelling the ground to make it fit for traffic; but it does not include repaving with granite.

2029. After that, do you generally pay to the parish a certain sum of money, which the parish expend in filling in and perfecting the road?—We pay the parish or the local authorities, whoever they may be, a certain charge per yard for such paving as is done over the open trench.

2030. *Chairman.*] Do I understand that the cost of 3 *s.* 6 *d.* per yard is to make the place fit for traffic?—That would include merely the filling in of the ground and roughly levelling it over, so as to make an even surface; but we should not reinstate the granite paving or flag paving.

2031. Mr. *Richards.*] That 3 *s.* 6 *d.* includes everything in the shape of macadam, but does not include granite paving?—It does not include granite, concrete, or flag paving.

2032. Any special paving would come extra?—Yes.

2033. *Chairman.*] The macadam costs something, I suppose; do you macadam the surface?—The macadam, 9 or 12 inches thick, is thrown to one side of the road, and screened, and after the pipe trench is filled up to within about six inches of the surface, the screened macadam is put upon the top of the consolidated new surface, so that it is macadam again.

2034. Supposing that it is not macadam but is a granite paving, what would be the additional price you would pay for that?—The ordinary granite, that is to say seven-inch pitching with eight inches of concrete, would cost us 1 *s.* 6 *d.* a yard.

2035. And that would have to be added to the 3 *s.* 6 *d.* in the case of the granite?—Yes.

2036. Is a large proportion of the district you light, macadam?—The leading streets are macadam.

2037. What is Southwark-street?—That is granite.

2038. So that the cost of laying in Southwark-street of a 12-inch pipe would be 5 *s.* a yard?—Including the cost of repaving, but not finding any materials.

2039. *Chairman.*] What does the 3 *s.* 6 *d.* a yard include?—It includes the excavation of the ground; what we call the pipe trench, the transport of the cost of the iron to the trench, the laying and jointing of the pipe, refilling the trench, and repairing the surface, and making it fit for traffic.

2040. Where do you get your pipes from?—The bulk of our pipes come from Newcastle, and are delivered in the river, put into barges, and brought alongside one or other of the wharves.

2041. What does the carriage of a 12-inch pipe to the ground in Southwark-street cost?—Two shillings and sixpence a ton; 10 *d.* a pipe.

2042. Mr. *Powell.*] After you have once levelled the road, I suppose you have to level a second time, in consequence of the sinking of the ground?—The local authorities charge a small sum, I think 3 *d.* a yard generally, if the ground requires reinstating; but with macadam there is not much subsiding.

2043. Mr. *Flwyer.*] Does the 1 *s.* 6 *d.* a yard include new granite blocks?—No, only the reinstating of the old ones.

2044. Mr. *Richards.*] The 1 *s.* 6 *d.* per yard for granite paving is not required when it is macadam?—No.

2045. Now, you told us that 10 *d.* a pipe was the cost of conveyance from your works to Southwark-street?—To deliver it at the trench.

2046. Have you gone at all into the question of what would be the probable cost of laying a 12-inch pipe in the subways in Southwark-street; I suppose that it is a matter of speculation to some extent?—We have gone into it so far as

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the present subway is concerned, and we begin that inquiry by saying that the substratum is not sufficiently solid to receive heavy pipes.

2047. Should you find it necessary to place the pipes either upon brick piers or cast-iron chairs?—We should.

2048. I believe that that is part of the promoters' proposition?—Yes.

2049. Which do you believe to be most economical, brick piers or cast-iron chairs?—Brick piers.

2050. How many brick piers should you require to support one length of pipe?—We should require two piers in a length of pipe.

2051. With regard to the 12-inch pipe, what would be the cost of each of those piers?—The lowest possible sum would be 5 *s.* a pier.

2052. That would be 10 *s.* a length of pipe; that would give 3 *s.* 4 *d.* a yard, would it not?—That would be so.

2053. *Chairman.*] How many yards of brickwork are there in each pier?—There are 14 feet of brickwork in each pier.

2054. Mr. *Richards.*] Supposing that you had cast-iron chairs, as they propose, do you think that they would be more expensive than the brick piers?—I have no doubt they would, if they were made sufficiently substantial to maintain the pipes.

2055. Have you applied to Messrs. Aird & Sons, the great pipe-layers, to know the terms upon which they would undertake to lay pipes in those subways?—We have.

2056. What was their answer?—They declined to give a price. They said that they had no experience of the laying of pipes in subways; but they would do it for us, keep an account of the cost of labour and extra expenses, and make a return to us, and we should settle with them when the work was done.

2057. From having had no experience in laying mains in subways, they declined to give you a price?—Yes.

2058. Can you form any opinion as to what would be the expense of conveying your pipes from the works; I suppose that the conveyance to the top of the subway would be about the same as the conveyance to the trench?—Yes.

2059. Have you formed any opinion at all of the expense that would be incurred in getting the pipes into the subways?—The expense of getting 12 or 18-inch pipes into the subways, is hardly to be calculated, because you do not know the distance they would have to be transferred from the opening of the street.

2060. You mean that there is a certain opening in the street down which the pipes have to be let, and the particular point where the pipe is to be put may be distant from or near to that opening?—Just so.

2061. Have you formed anything like a guess or judgment upon the cost?—Even if the pipes were to be laid adjacent to the opening into the subway, it would cost quite as much to shift them 150 yards on each side of that opening as carrying them from the wharves.

2062. *Chairman.*] You say that it would cost 10 *d.* a pipe, which pipe is four yards long?—That cost is assuming you are adjacent to the opening. If you have to travel any distance beyond that opening with a 12-inch pipe, which weighs about 14 cwt., and obstructions take place, it would be impossible to estimate what the expense might be. I think that no one could give the cost which would be incurred by shifting.

2063. Mr. *Richards.*] It would be very much increased?—Yes.

2064. Supposing the pipes are in this subway and placed one above the other, how would you be able to get to the lower pipes or the middle pipes if required?—The upper tier would have to be separated 18 inches clear to give an opportunity of working round the sockets of the pipes, to permit of a man's hands and arms going round the pipe, and therefore that would carry the upper tier of pipes almost to the surface of the arch.

2065. How could they be supported; would they be slung, or how would it be managed?—They would then require to be supported either by oak beams coming from the walls, or cast-iron tressel supports resting upon the brickwork below.

2066. Then if they are hung in this immediate proximity, would they not be exposed to vibration from the traffic above the subway?—They would not be subject to much vibration.

2067. Then, as a practical man, you are not in favour of subways?—I regard them as being very dangerous; I am afraid to use them for gas purposes.

2068. Do you like them the better because of your being compelled to go into them, and then being asked for rent when you are there?—That we entirely object to.

2069. Supposing that rent to be calculated at a per-centage upon the cost and only one company happened to use that subway, I presume that the whole rental would fall upon that one company?—It would.

2070. I suppose that you can hardly form any opinion of what the annual rent would be, because it depends entirely upon the cost at which the subway is constructed?—We have a little idea of what the Southwark subway has cost.

2071. Can you form any opinion of what sort of rental would fall upon you at 4 per cent. upon the outlay?—We have no doubt at all that it would be 640 *l.* a year, because the subway has cost them 16,000 *l.*

2072. That might fall entirely upon one company?—Yes.

2073. Do you consider that undesirable and unjust?—I consider that it would be ruinous.

2074. I understand that your present pipes run along the side of the road, close to the footway in Southwark-street?—There are no pipes in Southwark-street. It is not occupied by any pipes for any purposes whatever. A service pipe has been laid by the contractor for the street, for the purpose of supplying the lamps in the street.

2075. I understood you to say that your practice was to lays mains on each side of the street?—In High-street and the Borough, and all the leading streets which we supply, we have a pipe in the footway, and a leading main in all our leading streets.

2076. Then, if your pipes are forced into the subway, would not everyone of your services be lengthened by just the increase of distance from the footway to the subway?—They would.

2077. We are told that there is no difficulty in it. But supposing the pipes in the subway, 10 or 12 feet under the surface, have to be connected with pipes which are not under the subway, but at a distance of two and a half or three feet from the surface, do you think that there would be inconvenience in connecting the pipes themselves?—There would be great inconvenience in connecting the pipes themselves; but apart from that, if the pipe in the subway was charged with gas, and the connecting pipe in the adjoining road to that pipe was also charged with gas, I think that it would be almost impossible to do the work unless the whole of the surface was exposed, and the street adjoining it was opened entirely, so that the work could be done in the open air. I do not think it possible to make a breach or junction in a pipe in the subway.

2078. Supposing the leaving of a branch at a higher level and descending into the subway at a lower level were at all of frequent occurrence, would that necessitate an additional pressure?—As a matter of necessity it would. Any obstruction to the equal even flow of gas creates a necessity for an increased pressure.

2079. And the leakage increases in exact proportion to the pressure?—Rather more than in an exact proportion. As you increase the pressure you increase the velocity with which the gas escapes.

2080. Then, as the pressure increases, so, I suppose, does the chance of leakage inside the tunnel increase?—Yes. It would be much increased by an additional pressure.

2081. And increased substantially in consequence of the necessary dip into the subway?—It is so.

2082. The service pipes you say would have all to be made of an additional length; are not the service pipes the most perishable part of the whole concern?—They are. In our experience, the service pipes underground are not to be trusted beyond ten years, and therefore in such a situation as the Southwark subway, where they would be exposed to damp, oxidisation would take place rather rapidly. I think they would be scarcely more enduring there than they would be in the open air. In reference to the increased cost that it would be to us, each of the service pipes would be full 20 feet longer for the subway of Southwark-street, than they would be if the pipes were laid under the ground in the ordinary way.

2083. With reference to the annual expense, in your judgment what would be

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the saving, if any, in the annual expense of pipes, compared with service pipes laid in a subway, and those laid in the soil?—I do not think there would be any saving in that respect. I do not think pipes would last any longer in a subway than they do in the soil.

2084. How long should you say gas pipes would last in the soil?—We have had many mains down for 40 years, not yet taken up.

2085. Have you ever seen a main taken up that has been down 40 years?—I have seen a main taken up that has been down 38 years.

2086. Did you find any perceptible injury to that main?—It was removed in consequence of being too small, and not on account of its insecurity.

2087. Was it in a good state when taken up?—Yes; we laid it again elsewhere.

2088. You would not have done that unless it had been in good condition, I suppose?—No.

2089. When you talk of the comparison in cost of pipes, you have the additional cost of all the watching and inspection which they talk of in these subways; that is a charge to which you are not liable now?—No, we have no expenses of that description.

2090. *Chairman.*] Where is your reservoir?—Our works are just at that yellow point (*pointing them out on the Map to the Committee*).

2091. Mr. *Richards.*] You have told us that, practically, it would be necessary to have a space of something like 18 inches round a pipe in order to be able properly to take care of it?—Yes; I think it is impracticable to attend to the joints and set the pipes to work without having such a space as a man can work his arm freely in for hammering, and 18 inches is as little as a man can do that in.

2092. Supposing it happens in a subway, laid in an ordinary street, that it becomes necessary to alter a six-inch pipe into a 12 or 18-inch pipe, does it strike you whether there would be any difficulty in that?—I think there would be very great difficulty indeed, as well as great inconvenience to the district, because you would have to shut off a six-inch pipe at either end, and thereby throw the whole of the supply out.

2093. Then you would have to bring the 18-inch pipe closer to the other pipes?—Just so.

2094. In order to be able to let down the 18-inch, you would have, in fact, to remove the other pipes so as to increase the space?—We should.

Cross-examined by Mr. *Phinn.*

2095. Do I understand that if a subway is constructed and you are offered the use of it for nothing, you would not use it?—I would not.

2096. Then you think that the construction of the subways is entirely thrown away?—For the purposes of gas pipes.

2097. You do not concur then with Mr. Jones, who was examined yesterday, who is the engineer of the Commercial Gas Company?—I should like Mr. Jones to have seen the subway first.

2098. You do not concur with Mr. Jones?—I do not.

2099. Have you seen the Nottingham subways?—I have not.

2100. Are you aware that they are used?—I have heard, in this room, that they are used.

2101. You do not concur with the gas engineer there?—I have not heard a gas engineer from Nottingham examined upon it.

2102. It has been stated that they have used the subways?—Yes; but I think a subway of 50 yards in length is an ideal thing.

2103. You know the Equitable Company?—I do.

2104. They have an engineer of experience, I suppose?—They have.

2105. They have used the Covent Garden subway?—You cannot call that a user of a subway; it is ridiculous to talk of it as such.

2106. But, however ridiculous, they have used it?—They have two 6-inch pipes in the Covent Garden subway for the purpose of gas.

2107. Have you been down there?—I have, several times.

2108. When did you first go down into the Covent Garden subway?—I suppose 18 months ago.

2109. What

2109. What took you there?—To examine it before I should object to the Southwark subway.

2110. I suppose you had formed an opinion before you went down that it was an objectionable thing?—No, I did not. I had no prejudice before I went.

2111. Were the pipes down when you first went?—The water company's pipes were.

2112. Then the gas company's were not?—I did not see the gas company's. They might have been, but I did not see them.

2113. Have you ever been down there since they have been there?—Perhaps five times.

2114. Have you examined them as they lie there?—I have.

2115. And the service pipes?—And the service pipes also.

2116. In what state are the gas pipes?—The cast-iron pipes are very well; they are imbedded in the gravel underneath, perhaps about nine inches below the surface.

2117. In what state were the service pipes?—One that we saw was not in a very satisfactory state.

2118. We have heard of one; but I will take the others?—The others that we saw recently were very well. I did not see anything to quarrel with.

2119. Did you ascertain how long they had been down?—Some had been down 12 months; but this street is not occupied. When I went down there, there were only two houses in the whole street.

2120. You think, then, that none of the advantages which we suggest from the use of the subway are likely to be realised, such as facility of inspection, for instance?—That is very considerable.

2121. Do you attach much weight to that?—We like it very much.

2122. How do you lay your gas pipes? Are they laid by contract?—They are laid by contract.

2123. Do you not find the work occasionally scamped?—No, never.

2124. Never?—Never that I have experienced. I believe our work is as efficiently done as any company employing their own workpeople can possibly do it.

2125. Do you not find occasionally that the workmen do not do the work as well as the company could wish them, both in laying the pipes and in connecting the pipes?—In connecting the pipes there is an objection.

2126. It is a very good thing when the work is done, and the men come to be paid for it, if you could look over it?—We always have an inspection of the operations both in making communications and in laying pipes also.

2127. Before the soil is put over them?—Yes.

2128. Who does that?—The inspector that I appoint specially for that duty.

2129. And even with that inspection they fail?—Many times they fail.

2130. What is the average leakage of your company?—The unaccounted-for gas (it is not quite leakage from the gas pipes) for the last two years has been 11 per cent. over the registered quantity by the station meter.

2131. Do you mean 11 per cent. in value?—In quantity.

2132. What is the gas rental?—£.144,000 a year.

2133. That is the gas rental proper?—The gas rental proper.

2134. Do you find, sometimes, that the road is not properly covered, so as to support the mains?—We do.

2135. Do you not think that a slight foundation for the mains would be a very good thing?—We endeavour to procure as solid a foundation for them to rest upon as practicable.

2136. With all your endeavours, does it not sometimes happen that your company, and other companies over which you have no control, loosen the earth?—We have found that to be the case, to our serious inconvenience, from competitive pipes. We have often found that a very formidable cause of complaint.

2137. You may have laid the works very well?—Yes; but competitive gas companies, in excavating for laying their pipes, loosen the earth, or might do it very badly.

2138. Or the water companies might do it very badly?—Generally, the water companies lay their water pipes carefully.

2139. I must not ask you to say a word against the water companies, because you are in the same boat now?—We have operated very friendly together, for the last 30 years.

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2140. But they have got some very stringent clauses in the Metropolis Gas Act, as you are aware, to prevent your fouling their water?—They have.

2141. Do you not find that the earth is saturated in every direction with gas?—We do not.

2142. Do you happen to supply Pall Mall?—No.

2143. You did not supply that product which was produced yesterday?—I could quite conceive such a product as that being procured, where what we call a receiver exists, where the deposit has been allowed to accumulate in that receiver, and pumped into the street adjoining.

2144. That was derived, unfortunately, from the knowledge of one of the counsel in the case?—I am not going to say that that was not a picked place. I cannot conceive that in Pall Mall the substratum of the soil is in the condition of that small portion we saw here yesterday.

2145. You say that is not a fair sample?—I am sure it is not a fair sample.

2146. Would you like to take a sample elsewhere?—Yes.

2147. In Pall Mall?—Yes; or anywhere else.

2148. Do you know of any which was taken in front of the Opera House?—I have seen a considerable extent of ground opened in front of the Opera House and Pall Mall; and I have seen very clean ground indeed taken out of the opening in front of the Opera House.

2149. That you do not think is a fair example from Pall Mall?—I am sure it is not.

2150. In your own district have you ever taken an opportunity of testing the per-centage of the leakage of gas?—I have never seen the per-centage of gas; we have one or two streets that are bad.

2151. What does that arise from?—Partly from soap ashes which have been deposited to raise the surface of the ground.

2152. What are soap ashes?—The refuse of soap works, and partly from the refuse of dust being put in to raise the surface.

2153. Do you carry into your accounts what it costs you for breaking up the streets in the course of the year?—Yes; I can give you that.

2154. Have you got that as a distinct item for last year in your accounts?—Not in the general accounts which are published; but I can give you the whole expense of the Phœnix Gas Company for three years for paving operations, laying mains, altering and repairing, and laying the service pipes.

2155. How many miles?—Three hundred and ten miles of pipes. During the three years we have laid altogether at the rate of eight miles of new pipes, and relaid three miles of old pipes; and the cost of paving for each year has been 698 *l.* as a separate item.

2156. *Chairman.*] Are your new pipes in the place of old ones, or are they quite new trenches?—The bulk of them are entirely new trenches, and paved over chiefly by flag paving.

2157. Mr. *Phinn.*] Do you mean a new district?—Not a new district, it was a substitution of larger mains for small ones.

2158. Mr. *Powell.*] It was chiefly flagging paving?—Flagging paving.

2159. Mr. *Phinn.*] What I wanted to know was, what your cost was for breaking up the streets, with reference to your existing system for the last three years?—I am not able to separate the items.

2160. As you are not able to separate the items, I will ask you, does that include what the parishes charged you for their work?—That includes all the expense of repaving streets by the parishes, or by the contractors, or any accidental cost for paving the streets.

2161. Your operations are all in Surrey?—Yes, not any on the Middlesex shore.

2162. You think we came upon what we call in mining, a pocket of gas?—I do.

2163. Those pockets do exist then?—Sometimes.

2164. Do you find them exist in your streets frequently?—Not frequently; but we know where they exist.

2165. We have been very lucky miners to hit upon a pocket?—I can quite understand that perfectly; there is no difficulty about that.

2166. Now, let us come to this much talked of Southwark-street. What are the streets which meet Southwark-street, to use a nautical expression, end on?—Gravel-lane

—Gravel-lane is one, Southwark Bridge-road is another, and Red Cross-street is another.

2167. Is that end on, or at right angles?—No, end on would be Stamford-street.

2168. And then the other side?—Nothing, it goes at right angles into High-street, Borough.

2169. I think you told us what you have got down in Stamford-street?—I think not.

2170. If you have not, will you be kind enough to let us know what you have down in Stamford-street?—We have, or within the last three months we had, six mains in Stamford-street.

2171. What for?—We had supply mains and service mains.

2172. What are the dimensions of the supply mains?—One of six inches, one of five inches, two of four inches, one of three inches, and one of nine inches.

2173. Those are the supply mains?—Those are all the supply mains.

2174. Then the greatest one was nine inches?—Yes.

2175. Those are all the mains you had?—Three months ago.

2176. What have you now?—We have now, one 14 inches, one eight inches, one six inches, and two five inches. The two smaller ones that I have just mentioned are left as useless in the street, and discontinued

2177. Is it your practice when you put down new mains to leave the old ones there?—No. Will you allow me to make one observation with reference to Stamford-street. About four months ago we had notice from the parish authorities, after the opening of New Southwark-street, that the traffic had become so enormous in Stamford-street that the macadamized paving would not stand the wear, and they gave us notice that they proposed to repave it with granite on a concrete bottom, and they required us, if we intended to make any alterations in our mains that we should do them as early as possible before the repaving of the street; in consequence, we have sent a new line of pipe through the street, and the water companies have done the same thing, and disturbed the street, as perhaps some of you have seen very recently; therefore, that is the cause of so many pipes being in Stamford-street.

2178. Will it be necessary to continue those pipes through Southwark-street?—No, it will not.

2179. What do you want for the immediate purposes of Southwark-street?—One 18-inch pipe as a supply-pipe and two 10-inch pipes for service mains.

2180. Should you want a pipe of greater dimensions in Southwark-street than you have got in Stamford-street?—Yes.

2181. Why should you want a larger pipe?—It is more in the centre of our district of supply; it immediately connects High-street, Borough, which is one of our main and important thoroughfares, with the Blackfriars Road, which is another important thoroughfare, in the district of the Phœnix Gas Company, and therefore ought to have a large connecting pipe.

2182. I dare say I am asking you a question which practically looks an absurd one. If you are going to connect Southwark-street with your Stamford-street system, how are you to connect the 18-inch pipe and the 14-inch pipe?—We have in Gravel-lane pipes crossing at almost equal distances the end of Southwark-street; they themselves mean to bring in a supply pipe coming from the gas holder in Wellington-street, almost into the centre of the district.

2183. That would come at right angles?—Yes.

2184. Then you have one in Gravel Lane?—Yes; we have a large supply pipe.

2185. That is an 18-inch pipe?—Yes.

2186. Should you not continue the 14-inch pipe longitudinally along the street?—We should not.

2187. How would you supply the immediate wants of Southwark-street?—By a 10-inch pipe.

2188. Do I understand you that the 18-inch main would not be connected with any service pipe in Southwark-street?—It would be connected at intervals of about 200 yards with the side service mains by branch pipes, and it would be connected with each of the crossing streets that I have mentioned to you, that is, Gravel-lane, Southwark-bridge Road, and Red Cross-street.

2189. Then this supply main would of course be destined for other districts?—That is so.

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2190. The immediate wants of Southwark-street would be supplied, I suppose, by the 10-inch main?—The consumption of the residences in Southwark-street would be by the 10-inch main.

2191. Are you aware that in Covent-garden the main is laid, and the service pipes radiate from the main on each side to the houses?—No; there are two mains, and the service pipes go from the exterior sides of them.

2192. From each main?—Yes.

2193. You would propose a 10-inch main for the purpose of Southwark-street?—Yes.

2194. I cannot understand if you have got this 18-inch main in this street, why you want a main of such large dimensions as a 10-inch main to supply the houses in that street?—I think you will find a little difficulty in understanding that; some of the consumers of Southwark-street we apprehend will be very considerable, and some of them will require a 3-inch service pipe.

2195. Mr. *Powell.*] Some individual customers?—Yes.

2196. Mr. *Phinn.*] How many cubic feet of gas will that supply?—That will supply a 300 light meter. We have many consumers who take a 5-inch service pipe.

2197. You are speaking of manufactories?—Yes; there is one warehouse, going up now between Southwark-bridge Road and Guildford-street, which it will not be very difficult to estimate will consume about 400 *l.* of gas a year; therefore, in making provision for that, it is necessary that the service main should be sufficiently large to give a supply on each side of that large diameter which I am now mentioning, without decreasing the general supply to the smaller consumers.

2198. Stamford-street is a street of large business, is it not?—No, of no business at all.

2199. Are they all private houses?—I think so; I think there is scarcely a shop in it; they are all private houses.

2200. Surely there are some very good customers there?—No, very bad; I should say just the opposite; it is one of the poorest streets in our district, and not a very respectably inhabited one as well.

2201. Viscount *Grey de Wilton.*] Mr. Cox, the horse dealer, lives there, does he not?—He does.

2202. Is he a good customer?—About the best we have in the street.

2203. A pretty good one?—As good a paymaster as any we have in the street.

2204. Mr. *Phinn.*] As I understand you, you said among other things, that you wanted a space of 18 inches under each pipe to get access to the pipe?—We do.

2205. Did you hear Mr. Upward's evidence yesterday?—Yes.

2206. He did not seem to take the same view?—I think he did.

2207. Not 18 inches?—I think the apparatus he brought here would occupy quite 18 inches.

2208. Do you recollect that he told us that the bulk of the apparatus might be diminished, and I think he said that he could work in six inches. "1771. What is the minimum space that you would require? I should think I might do in half the space, or less than that.—It would require 10 or 11 inches, would it not? I could do it in less than that; I think I might do it in six inches if required." If he could work in six inches could you not work in six inches?—We require for laying pipes ——

2209. We are speaking of the pipes as laid. Supposing you want to get access to the pipes?—We could not attach a service pipe to a main in an intervening space of six inches.

2210. I thought you said you wanted all round the pipe a surface of 18 inches elbow room, in order to have an inspection in the first instance, and operations in the second?—Operations chiefly.

2211. For inspection, six inches would be enough?—Anything would do for inspection.

2212. Now, let us come to operations. Mr. Upward certainly said he thought he might connect, leaving a space of six inches; do you agree with him?—No, certainly not.

2213. I do not suppose you ever worked at that practice yourself?—Yes, I have tapped a hole.

2214. What do you have practically in the trench under the pipe?—We have 12 inches

12 inches at the very least; that is merely for the working of the hand with a hammer.

2215. Always clear?—Always clear; we could do it with less.

2216. That is with a hammer, and not with a drill?—We never tap mains at the bottom.

2217. Do you constantly chip with the hammer and chisel?—No, we drill sometimes.

2218. Is it not your constant practice to chip?—No.

2219. Is it done?—Frequently.

2220. In the open street?—In the open street very frequently.

2221. Have you not known companies held to be responsible in damages for that?—I have heard of such a charge being made.

2222. People's eyes suffer, do they not?—Yes; I know an instance of one man in Sheffield.

2223. You did not hear of a case the other day down towards Richmond?—No.

2224. At any rate, any danger of that kind would be obviated in the subway?—I do not think you would get passengers to come and look quietly on in the subway.

2225. We have heard about this Wood-street explosion; was not that practically from the carelessness of the man connecting the service pipe?—I think I had better not answer that question.

2226. The thing is over now, and has been decided; I ask you whether it was not from the carelessness of the man working at the connection of the pipe?—I think that is hardly a fair question.

2227. You paid 40,000*l.*, did you not?—The whole expenses were commuted at that; but I do not think that is quite a fair question for me to answer.

2228. *Chairman.*] There was negligence, there is no doubt?—Yes.

2229. Mr. *Phinn.*] Was that a case of chipping?—That was a case of chipping.

2230. You gave us some details about the cost, as to which I did not follow you very accurately. One thing startled me particularly; I think you said that the 12-inch pipe weighed 14 cwt.?—I did not say that a 12-inch pipe weighed 14 cwt.; a 12-inch pipe, nine feet long, weighs 6½ cwt.

2231. *Chairman.*] What you said was, that an 18-inch pipe weighs 13 cwt.?—Yes.

2232. Mr. *Phinn.*] What I took was, a 12-inch pipe, weighed 14 cwt.?—I never heard of such a thing.

2233. Did you say that an 18-inch pipe weighed 13 cwt.?—A water pipe; a 12-inch gas pipe, nine feet long, would weigh 6½ cwt., and the water pipe is made stronger, from 10 to 15 per cent. more weight.

2234. You startled both Mr. Bramwell and myself, because we both took it down, certainly. Now, you spoke of the expense of the lowering; the lowering, I suppose, would be a very simple operation, assuming the aperture to be large enough?—Very; there would be no difficulty whatever.

2235. There would be no difficulty in lowering?—No.

2236. Would getting along the subway be a special operation?—Not at all.

2237. Why not?—Because it has to be carried.

2238. There was the suggestion of either rollers, or a sort of tram?—Rollers are exceeding inconvenient, because they require constantly shifting. A tramway would be expensive, and would be more than the value of laying a pipe itself.

2239. You might have a permanent tramway?—There is no other purpose for the tramway after the pipes are laid; a temporary tramway, put down for the purpose of laying a 12-inch pipe, would be more than the value of the laying.

2240. What is the longest time that you have had a street open within the last three years, impeding the traffic?—In any one spot, or for the whole length?

2241. In any one spot?—Three days.

2242. And for the whole length?—Perhaps four weeks.

2243. Of course that is a serious matter to shopkeepers?—Sometimes.

2244. Loss of traffic and loss of custom?—It is inconvenient.

2245. But there is loss of custom?—And loss of custom. We very much

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regret to have to do such a thing in a crowded street, and we endeavour to do as much as possible from three in the morning till nine o'clock in the morning.

2246. Is there any concert between the water companies and you?—If it is a joint opening, such as in Stamford-street, it is done concurrently.

2247. There the parish authorities are the movers; they gave you notice?—Yes.

2248. Assuming you wanted to lay a main, or supposing you wanted to take out the old main and put down a new one, should you send to the water company and say you wanted to do it?—We should not.

2249. Therefore, if a week afterwards they wanted to take up a main they would break up the street again?—They would.

2250. Do you think that a convenient state of things?—Very inconvenient, because the work might be done at the same time.

2251. There is no power in any Act of Parliament to compel you, that you are aware of?—I think, with regard to companies supplying the public, we should endeavour to do everything in concert, and carry out all our operations so as to suit the public convenience.

2252. You never have carried that concert out yet?—Frequently.

2253. Not as a rule?—Generally, the work that is required to be done in the road or street is done with as little inconvenience as possible.

2254. Are there any other gas companies besides your own whose mains traverse the same street?—There is the London Gas Company, at Vauxhall.

2255. What length of mileage have they in your district?—It would not come to mileage.

2256. That is a mere casual passing?—But it is a very important thoroughfare.

2257. For what length; does it come to half a mile?—No, I should say not.

2258. A quarter of a mile?—About a quarter of a mile.

2259. With the exception of that, you are lords and masters in your own district?—With one exception, and that is at the junction where the Surrey roads meet at the Elephant and Castle; that is an isolated spot.

2260. In Southwark-street we are not to expect any other gas company but yourselves?—We hope not.

2261. That is under your present arrangements?—Yes.

2262. What water companies are there in your district?—In St. Saviour's, the Southwark Company; and in Christchurch, the Southwark and Lambeth.

2263. Is there any duplication of gas and water pipes in the same street?—There would be in Christchurch.

2264. Would that affect Southwark-street?—It would for one half of its length, from Gravel-lane to Blackfriars-road.

2265. Do you mean that we should have two water companies for one half of its length?—Yes.

2266. And the other half you would?—The other half is the Southwark Water Company only.

2267. Are you responsible for this pretty diagram?—I am.

2268. This is a representation of the Southwark subway, as it would be, with the gas and water companies in it?—As we have provided, or expect to provide, the supply of Southwark-street.

2269. You have put this service pipe as running clear of the subway?—Yes.

2270. Do you not know that it has been removed to the top of the arch?—At present the contracts for the subway put us to the expense of the removal of the pipe.

2271. Their pipes merely cross the street and supply nothing in it?—Two of them cross the street to take the gas from the manufacturing station at Bankside to the gas-holding station at Wellington-street. The supply pipe in the district would be connected with the 18-inch pipe in the subway.

2272. But you could connect it without bringing it into the subway?—I do not know where.

2273. Mr. Bramwell gives me that (*handing a Sketch to the Witness*)?—It is quite idle to think that we should be put to the inconvenience of making such a circle as that.

2274. I am asking whether it can be done?—Not without a very serious impediment to the flow of gas.

2275. It

2275. It could be done?—I do not think that any practical person would do it.

2276. This pipe can be bent so as to adapt it to the arch?—It has a depression at each side of about nine inches.

2277. It might be sunk on this side below the crown of the arch?—It might, but to talk of it in the other way is so ridiculous, that I think you will scarcely entertain it.

2278. You have suggested this mode of carrying it through the arch?—We have no alternative.

2279. You have suggested it as a practical thing?—We have no alternative.

2280. I suppose you would not suggest anything that is not practicable?—No.

2281. I see you have shown an uncommonly little space between the crown of the arch and the roadway. There would be room to lay the little pipes which are now laid according to your own diagram?—The pipes that we have laid now come within two inches of the soffit of the arch. The large pipe that we have crossing the street comes to within two inches of the soffit of the arch. Underneath there is a cast-iron plate.

2282. This is not a correct section?—It is.

2283. *Chairman.*] It is as it is now?—No.

2284. But as it is proposed to be?—Yes.

2285. Mr. *Richards.*] There are no pipes in the subway?—No.

2286. Mr. *Phinn.*] But the pipes can be shown going over the top of the arches?—Not in the subway.

2287. Is there not a pipe running over the top of the arch?—Three pipes.

2288. Do you mean to represent that as showing the pipe between the top of the arch and the road; is that drawn to scale?—Very nearly.

2289. Is it, or is it not?—The top line is the scale.

2290. That does not agree with our section?—I think you will find that they are as close as possible. The distance from the soffit of the arch to the top of the granite is 2 ft. 9 in. Our pipes occupy 21 inches out of that.

2291. Mr. *Powell.*] For how long a distance is it not 2 ft. 9 in.?—Immediately over the arch.

2292. For what distance?—Perhaps 50 yards on each side of Gravel-lane. It was made in order to adapt Gravel-lane, being a little lower than the general traffic of the subway.

2293. Mr. *Phinn.*] Is this pretty production yours (*referring to the other Diagram*)?—It is.

2294. This you put forward, as I understand your evidence, as a fair indication of what the state of things in Southwark will be, applying the state of things as they exist in High-street and Bridge-street, Vauxhall?—Yes; that shows that the provision which would be necessary to be made at Bridge-street, Vauxhall, for the pipes which now exist in New Bridge-street, would crush them into the space such as represented there.

2295. I take your own words, "Section of Southwark Subway adapted to High-street and Bridge-street, Vauxhall"?—Yes.

2296. Then you translate the Southwark-street Subway to High-street and Bridge-street, Vauxhall?—For the purpose of showing how much larger a subway would necessarily be required to receive all the pipes in High-street and Bridge-street, Vauxhall.

2297. That is to say, if we were going to construct a subway for New Bridge-street, Vauxhall, then it would require a larger subway than Southwark Subway?—It would.

2298. Does that happen to be the very place of your manufacture from which your mains all radiate?—We have large mains there, and conduct the gas from the gasholder through the pipes supplying the district of the company.

2299. Then you have selected the place where the mains are the thickest?—I have, upon the same principle as your friend at Pall Mall acted upon.

2300. If we were going to make a subway, as I understand you, in the neighbourhood of New Bridge-street, these would be the dimensions we should require?—I think you would require a 25-feet subway.

2301. You know there is no proposal of that kind at present?—No, not since we have been meeting in this room; but before we came into the Committee-room I think we were provided with a clause that would have over-ridden the

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whole of our district. And by that clause we should have been compelled to have laid our pipes in the subway.

2302. That is, if Parliament had given us power to make the subway?—If Parliament had given you the powers you had applied for.

2303. Do you find the frost affect your pipes at all?—Yes, very considerably.

2304. Do you find it affect them more when they are laid in wet earth?—Yes.

2305. Then the corrosion is more rapid?—Not altogether in wet earth. We do not find that wet earth is more corrosive; but we find that the frost penetrates into wet earth.

2306. Do you not find that corrosion is more rapid in wet earth?—No; corrosion is more rapid at particular spots of the ground.

2307. Is not wet an element producing rust?—If it is accompanied by intervals of dry atmosphere as well, but not absolutely wet.

2308. You state that your service pipes last about 10 years?—That would be about the average duration.

2309. Then in every 10 years have you put new service pipes throughout your district?—I think that would apply to all our leading streets. They have been from time to time renewed.

2310. Of course they are not all laid at the same time?—In some places they are. We have, in this portion of our district, relaid the service pipes for a mile and a half, and the mains throughout.

2311. Then, of course, that relaying is one of the great elements of your tearing up the streets, is it not?—It is.

2312. Arising from the decay of your service pipes?—Yes.

2313. Your idea is that the service pipes would not last longer in these galleries than in the earth?—We think not.

2314. Upon what ground do you form such a judgment?—In our own works we have a large quantity of service pipes to our retort houses in a fair condition.

2315. Exposed to wet?—To the open air, under the floor of the retort houses; and we have also our pipes round the buildings and works, and in our coal cellars, where they would be in an equally sheltered state as the Southwark Subway portions.

2316. Are the conditions quite the same as in the subway?—Our pipes are more sheltered than the pipes in the subway, because they are not interfered with by strangers.

2317. Do you ascribe the interference to these people going up the side alleys to the houses. Who would there be to interfere with you; you are the only gas company?—Yes.

2318. And who else would there be to interfere with you? There would be the water company's men?—Yes.

2319. Then the interference would be confined to the water company's men?—Or to any man who offers the largest sum of money for the use of the subway. You do not confine it to the gas and water companies.

2320. Who on earth will use the subway, if the gas and water companies will not?—The Pneumatic Despatch Company.

2321. Do you suppose that the Pneumatic Despatch Company would be laying their pipes at right angles in the subway?—No.

2322. Who is there but the water and gas men, who would be up and down there?—The Underground Railway.

2323. You do not expect an underground railway in the Southwark Subway?—I do not know.

2324. Do you mean really to represent with a serious face to this Committee, that you expect there will be any interference from these side alleys?—No.

2325. Do you happen to have carried your pipes over any of the bridges of the metropolis?—Over Southwark Bridge.

2326. How do you carry them?—Upon an external parapet.

2327. Open to the air?—Yes.

2328. How long does that last?—That has been done 25 years.

2329. How are the lights on the bridge supplied?—By service pipes rising from that pipe on the parapet of the bridge.

2330. How long do they last?—They have been renewed in seven years.

2331. Then they have lasted seven years?—Yes.

2332. Are those service pipes?—Yes.

2333. *Chairman.*]

2333. *Chairman.*] Then they might have lasted ten years?—They might have lasted that length of time, but not all, because others of them have been renewed at intervals.

2334. Mr. *Phinn.*] You have a great number of pipes exposed about your works?—We have.

2335. Do you take any precaution to protect them by paint, or anything of that kind?—When they are in a position to be seen.

2336. *Chairman.*] That is for ornament?—It is not for the security of the pipe itself, but for decoration.

2337. Mr. *Phinn.*] Is there not some pigment which has been taken up very much of late?—We find that coal tar is about as good as anything else.

2338. That could be easily applied to a subway, I suppose?—Yes, without much difficulty.

2339. There is one question that I ought to have asked you in another order about these supports; you propose brick piers?—To support the pipes on the bottom of the subway.

2340. Would that pier carry both the water and gas, or merely be devoted to the gas?—The pier which we propose would be from the top surface of the smaller pipe, to the side wall of the subway.

2341. Then you would construct it once for all, I suppose, for both water and gas?—We would.

2342. Then I think you have stated you want a pier to each length of 12 feet?—Two piers.

2343. At 5 *s.* a pier?—That would be so as far as gas companies are concerned; but the pier itself would cost more than 5 *s.*

2344. What would you put the pier itself at?—Do you mean the value of it, so far as the gas companies are concerned?

2345. You would not want to duplicate that?—I think the piers would cost nearly 8 *s.* 6 *d.*, to go from the subway. There are nearly four feet of ground above the bottom excavation, which would all have to be taken out, and the brickwork would come up from the bottom.

2346. There are four feet between the surface of the subway and the top of the arch?—Yes.

2347. You mean on each side?—Yes; all that soft ground would have to be taken out.

2348. Then, in fact, you could utilize that, could you not; and if you wanted more room you could lower your pipe into that?—Into that hollow space.

2349. Yes?—Yes; and we think, so far as that is concerned, that it will be absolutely necessary. As the side entrances to the subway, as you will see, are on the same level as the floor, of the subway, if a 12 or 18-inch pipe were put in there, the sideway would be an obstruction to the extent of three feet in height.

2350. You could depress the sideway, could you not?—It ought to be depressed.

2351. That is a matter of practical detail which might be attended to?—Yes.

2352. Have you thought at all about the ventilation of these subways?—I have.

2353. Have you been down the Southwark Subway?—Many times.

2354. What do you think of the ventilation?—There is no ventilation at all.

2355. And the Covent Garden?—The ventilation there is worse, I think.

Re-examined by Mr. *Richards.*

2356. Is the pipe which you have put over Southwark Bridge wrought iron or cast iron?—Cast iron.

2357. You tell us that the service pipes about your works, you do not think, last longer than the service pipes in the street?—They do not.

2358. You mean the service pipes which pass near your coke ovens, and so on?—Yes, for the purpose of distributing the gas from the works.

2359. Every pipe is as much protected as it can be?—Yes, to a considerable extent.

2360. You have been asked also in reference to the extreme inconvenience of

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opening the streets, the gas people opening the streets one day and the water company the next, or three or four days afterwards; do you know that another body, called the Metropolitan Board of Works, open the streets occasionally to construct sewers?—Yes.

2361. Is there not a subsidence of the soil very frequently after the construction of sewers?—Yes.

2362. Is not that one of the most fruitful causes of the leakage of gas?—Yes; at Gravel-lane, where we have put in a new pipe, a charge was made against us by Mr. Lucas, the contractor, for allowing the gas to escape into the sewer, by which two men were killed, and two were very dangerously injured, and he was put to 500 *l.* expense by an explosion.

2363. You conceive that that leakage was occasioned by a subsidence of the ground after the construction of the sewer?—Yes.

2364. Nottingham, you say, is on a scale which does not form a fair criterion of whether these subways will answer, or not?—The Nottingham Subway is limited to a certain extent. The Phœnix Gas Company supplied gas for some time in the reconstruction of an hotel at Greenwich where there had been an explosion of the service pipe. It had been negligently interfered with by a workman, and an escape took place. One man was killed, and another was very seriously injured, and we had to pay compensation to the injured man to the extent of 120 *l.*

2365. With regard to the Equitable Company, they are one of the companies which show their appreciation of this plan by petitioning against the Bill?—They do.

2366. With respect to the mode in which your connexions are made, you say your pipes are laid by contract?—They are.

2367. Do you have an inspector to superintend the laying of every single pipe, and the cementing of every single joint?—We do.

2368. Do you take every possible precaution in laying your pipes which you could take if they were laid in a subway?—We do.

2369. I do not know whether this was the production of Mr. Phinn, or of a practical engineer (*referring to the Sketch which Mr. Phinn had handed to the Witness*). You do not think that is a very practical plan?—I should say the person who did that never had much to do with gas.

2370. Here it is carried over the subway?—I suppose that was an idea of the way in which it might be done.

2371. You, as a practical man, do not approve of it?—No.

2372. With regard to those mains, do they include gas and water?—Gas and water in one portion of the subway.

2373. With regard to the other portion, was that prepared at the period when the proposals to make subways in existing streets had not been struck out of the Bill?—That was prepared before we came into the Committee-room at all.

Examined by the *Committee.*

2374. *Chairman.*] Where do you take your gas to beyond Southwark-street?—How far distant do we take the gas?

2375. You want an 18-inch main to go through Southwark?—We supply the whole of the district from London Bridge to Clapham, and back again to Vauxhall Bridge.

2376. When you get into High-street, what does your 18-inch main join?—It joins another 18-inch main in High-street.

2377. Viscount *Grey de Wilton.*] Is yours the only company which supplies that district?—We are.

2378. You said you would require two 10-inch mains for the service of the houses; should you require two 10-inch pipes all the way?—Two 10-inch pipes the whole way.

2379. Why should you require such a large pipe for the houses?—Some of the consumers are very large. We should connect it with the large pipe which we propose to lay in the centre, and then the supply would be equal at both ends; and the adjoining street to Southwark-street would be under precisely the same circumstances, there being an 18-inch pipe in the centre, and two 10-inch pipes, one on each side of the way, from which the consumers are supplied.

2380. Are

2380. Are there any streets in which you have two 10-inch pipes for the supply of the consumers in the streets?—Yes, extending from the Elephant and Castle to High-street, Borough; and from Bridge House-place to Newington Causeway.

2381. Those are streets principally of shops?—Yes, and the same from Blackfriars-road, extending from Blackfriars Bridge to the Circus in the Blackfriars-road.

2382. *Chairman.*] Those are first-class streets?—They are large streets, but not first-class.

2383. Viscount *Grey de Wilton.*] Have you any means of estimating what sort of houses will be erected in this new Southwark-street?—They will be very good business houses; the cost of the houses which are proposed to be erected, and the expense of the freehold ground, are such that they must be houses capable of letting at 300*l.* a year.

2384. In fact, the same class of houses which are now about the "Elephant and Castle"?—They are a better class of houses than those; some portions of the frontages which have been let, are let for houses which they propose to sublet again at 500 *l.* a year.

2385. *Chairman.*] What is the length of your 8-inch pipe, by which you propose to take gas into the two 10-inch pipes?—It is about 200 yards.

2386. Is there any objection to making it 100 yards?—I think not.

2387. If you had to pay a larger sum for a 10-inch pipe than an 8-inch pipe, you will have no objection to placing it at 100 yards instead of 200?—That would rather decrease the supply from the main pipe, if we had a smaller service laid on.

2388. You would have a smaller service pipe if you were charged so much per cubic foot?—We would not go below an 8-inch pipe under any circumstances.

2389. You would take an 8-inch instead of a 10-inch if it was cheaper?—If we had to pay an annual rent; but we would prefer the larger to the smaller.

2390. You would take the smaller if it was a question between an 8-inch and a 10-inch pipe?—If we had to pay rent, we would use the smaller, but not as a matter of choice.

2391. Do you think the neighbourhood about Southwark-street is an increasing neighbourhood?—Yes, very considerable, both ways; the increase of the gas rental is very considerable indeed. That is the best criterion that we can go upon as to the increase of the neighbourhood.

2392. I am only alluding to the east of Southwark-street?—Our district does not traverse far beyond the east of Southwark-street, and going into a small part of Bermondsey.

2393. You talked of going down to Greenwich?—That is a detached district altogether.

2394. Where does your present 18-inch pipe come into?—It comes from St. George's Church.

2395. Is that supplied from your Vauxhall works at all?—We have a 24-inch main at Vauxhall, and another 24-inch main from that point (*referring to the Map*), and they meet together at St. George's Church. We have an 18-inch main which comes from the Borough up towards London Bridge.

2396. If the subway happened to be a small one, and you brought a large main from your Vauxhall station, it would be inconvenient?—Yes.

2397. You stated, did you not, that this street was supplied from Vauxhall?—No, from Wellington-street. We have a station at Wellington-street.

2398. A manufactory at Wellington-street?—A gas-holder station.

2399. Where is your gas manufactured?—At Bankside. The station at Vauxhall is more particularly for the supply of the districts of Clapham and Balham.

2400. Viscount *Grey de Wilton.*] You have a monopoly of the supply of gas for that district?—We have the supply of that district.

2401. Is that secured to you?—It is by the Metropolis Gas Act of 1860.

2402. For any period?—Until Parliament further determines.

2403. Then, as far as you can see, there is no chance of the pipes of another company being laid in Southwark-street?—We think not.

2404. *Chairman.*] How many applications do you make for opening the grounds in the course of a year?—For the purpose of service and mains?

2405. For every purpose connected with your gas?—Perhaps from 2,000 to 3,000.

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2406. Have you to write a letter for each?—Not a permissive letter; a mere notice that we are going to do such a thing.

2407. You have to write it and post it?—Yes.

2408. Do they send you a written answer?—No, because we have power to do it without permission.

2409. But simply giving notice?—From six to seven days' notice.

2410. I think you stated that you have no inspections; have you not men to look after your gas pipes every day, to see whether there is any leakage or anything of that sort?—Not street mains; they are all covered in. They are not inspected after they are once laid; we have no inspection of existing mains.

2411. Or of service pipes?—Or of service pipes; they are all in gravel.

2412. Viscount *Grey de Wilton.*] Do you not examine them from time to time?—No.

2413. *Chairman.*] How many men do you employ to go about the streets?—Twelve men, for laying the pipes and for repairing them.

2414. Viscount *Grey de Wilton.*] Then, in fact, the street is never laid open by you unless you have reason to believe that some accident is likely to occur?—If any escape of gas were to take place, that would be perceptible above ground, and we should then open the street to detect where the escape was. If a customer changes his residence, and applies to us to have the gas laid on, we then open the street; we also open the street for repairs; we do not, as a rule, open the streets without cause.

2415. *Chairman.*] Leakage may go on for a considerable time without your knowledge?—It may do so.

2416. Have you any idea of what amount of fraud is committed upon you?—I think we might say nil. I do not think that fraud amounts to an appreciable quantity,

2417. Viscount *Grey de Wilton.*] Then the whole loss of gas is from leakage?—That is one cause. Condensation causes a considerable loss; the liquid which is found in the chamber that we have heard of is condensed gas.

2418. *Chairman.*] Do you calculate that half the loss is due to condensation and half to leakage?—We might say that fully half is due to condensation.

2419. Then the leakage would be from 5,000*l.* to 6,000*l.*, I suppose?—It would be.

2420. Mr. *Powell.*] We have recently had great opportunities afforded by the Metropolitan Railway and the Great Sewer in London, of ascertaining the condition of the soil. I presume that in your occupations your attention must have been directed to that?—Yes.

2421. Can you inform the Committee what has been the condition of the soil, confining yourself to such a depth as may reasonably be supposed to be used by the gas pipes?—In some localities escapes of gas from defective pipes have gone on to a considerable extent; the soil is impregnated to a considerable extent in some localities. That applies especially to places where competitive pipes have been laid. During the competition of the gas companies, from 1846 to 1853, four sets of competing gas mains were in the same street.

2422. You have large consumers, I think, you said?—Yes.

2423. Warehouses and the like?—Yes.

2424. Can you inform us what is the condition of the pipes used in these warehouses, as regards leakage?—The majority of them are in a very fair condition; take an old established one, such as the brewery, where the pipes are very considerably exposed to damage; there they are constantly examined and carefully attended to, and the pipes are in very good order.

2425. Supposing that a company wishes to come into a roadway in which there are already gas pipes laid down, how are they restricted as regards the position in which they are to lay their pipes?—They are not restricted.

2426. Are they able to place their pipes in such a manner as to interfere with the pipes of competing companies?—Yes, they may place their pipes where they choose.

2427. London is districted as to sale?—It is for gas.

2428. But a company may lay down a pipe in the district of another company with a view to supply some other district?—With the permission of that company.

2429. Then

2429. Then that is the case?—Yes.

2430. Each company can only supply within its own district, but it may lay down, in the district of another company, pipes with a view of supplying its own district?—Yes.

2431. That would lead to a multiplication of pipes in a thoroughfare?—It would.

2432. Can you give the Committee any idea as to what is the extent over which that duplication of pipes would spread?—In the case of the London and the Phœnix Gas Companies it would extend to about 1½ miles.

2433. Do you find any difficulty as regards the supply of gas across that subway in Southwark?—Not any, the defection of the pipe is so small; it is only nine inches on each side.

2434. Viscount *Grey de Wilton.*] Suppose a new street to be constructed, and, for the sake of argument, a new subway, and you were consulted by the Board of Works as to the number of gas pipes which would be required in that street, would you have any difficulty in giving a positive statement as to the number that would be required, say for the next 25 years?—Not for 25 years; we could specify for 10 years with safety; but the increased consumption of gas goes on so rapidly that you could scarcely say for 25 years. You might readily provide for 10 years, but nearly half the mains of the gas companies have been entirely renewed in the course of 15 years, and taken out of one district, and large mains have been substituted, and those which have been taken out have been placed in more distant parts where less gas is required.

2435. The difference would only apply, of course, to large mains?—To large mains; the service mains would remain the same.

2436. The difference would be in the size of the leading main?—Yes.

2437. *Chairman.*] Did I understand you to say that there were two companies supplying Southwark-street?—Beyond Gravel-lane there would be two.

2438. They meet in the middle?—Yes.

2439. They supply each side?—Yes; there would be two companies at one end of the street, and one company at the other.

2440. Does one company run through part of the street which does not supply anything?—One company supplies water, and then it comes into another district, where two companies supply water in the same street.

2441. One on each side?—No, both sides; they may supply customers on either side.

2442. I thought that had been all arranged?—Not with regard to water companies.

2443. Viscount *Grey de Wilton.*] Have any arrangements, as far as you know, been come to similar to the gas companies?—Between the companies on the Middlesex side there is an arrangement of district; but between the Lambeth and Vauxhall Companies there has not been any arrangement which would preclude them from supplying any district on their side of the water.

2444. But arrangements are pending?—No.

2445. Then if there was a poor district which did not yield a profit to two companies—but, in fact, the probability is that only one company would use the Southwark-street subway, if that were the case?—We have not heard of any decision, as far as those two companies are concerned, as to whether they would isolate themselves.

2446. Do you know how many streets are supplied by two companies?—All the streets extending from Christchurch through Lambeth, or nearly through Lambeth. That would, perhaps, be to an extent of nearly 500 miles of street.

2447. Then how many from Christchurch to High-street, Borough?—Then the Southwark Company have the district to themselves, until they join again with the Kent Water Company.

2448. What district has the Southwark Company?—They would carry about 300 miles of pipe.

2449. Practically, do they supply Gravel-lane?—Both companies supply it. Both companies supply our own premises at Wellington-street and Blackfriars-road.

2450. Both companies supply you?—Yes; the Lambeth and the Southwark.

2451. Then you work one against the other?—No, we do not.

2452. Do you not try to get the lowest price you can?—We are friendly with both.

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2453. You put down 20 *l.* a mile for leakage; is that correct?—We have 310 miles of pipes.

2454. If it is 6,000 *l.* a year, that would be something like 20 *l.*?—It might be. I cannot give you the precise figures. Our leakage is 11 per cent. in the gross.

2455. Mr. *Richards.*] That is your unaccounted-for gas?—Yes.

2456. Mr. *Du Pré.*] You have given us your opinion that, in the Southwark-street Subway, there was no ventilation at all; and that in Covent Garden it is still worse; are you of opinion that no means can be adopted for producing good ventilation in subways?—I am quite assured that perfect means can be adopted for ventilation, and that a good current of air can be passed through the subway in Southwark, and at a very small cost.

2457. They have not at present taken the necessary steps?—They have not taken any pains whatever to produce good ventilation. There would be no difficulty whatever in obtaining such a force as would drive a current of air out of the subway.

2458. Without much additional expense?—I think very trifling. If those side entrances which have been referred to were continued and carried up, they would make a great ventilation of air in the subway.

2459. *Chairman.*] Did you suffer from the want of ventilation?—Yes; it became very oppressive; no man could work in it for five or six hours together without being in a state of suffocation.

2460. Viscount *Grey de Wilton.*] Have you been down a mine?—Yes.

2461. Do you think they are better ventilated than a mine?—The ventilation of some of the mines is very bad; the ventilation of the mines that I have been down happens to have been very good. I have been down in the Durham Fields, and I have felt a very oppressive feeling, but perhaps that was not so much from want of ventilation.

2462. You had your clothes on, and the miners are naked; perhaps that made a difference?—I had not all my clothes on; but I had an over-jacket.

[The Witness withdrew.

Edward Hawkins, Esq., sworn; Examined by Mr. *Richards.*

E. Hawkins, Esq.

2463. ARE you the Chairman of the London Gas Company?—Yes.

2464. Whereabouts are your works situated?—At Vauxhall.

2465. Very near the Vauxhall Gasworks that we heard of just now?—Not far from them; and we have other works at Nine Elms.

2466. You have been, I believe, connected as a director with the London Gas Company for many years?—Yes.

2467. And you are at the present moment the chairman of the Company?—Yes.

2468. You have had considerable experience, I presume, as to the requirements of gas companies, the mode of distribution, and so on, though not a civil engineer?—Yes; as a director.

2469. Has your attention been turned to the proposed subways into which they seek to compel you to go?—To certain matters connected with them not purely engineering.

2470. You, I believe, have no pipes which could be forced into the Southwark subways, have you?—None.

2471. That is to say, you light a different portion of the town?—Yes.

2472. *Chairman.*] Will you state what is your district?—The London Gas Company supplies several districts, divided from each other. The general districts would be Fulham, Chelsea, Belgravia, Battersea, a large portion of Lambeth, St. Clement's in the Strand, part of St. Andrew's, St. Giles, and St. George's. They are two separate districts.

2473. You have two works?—Yes.

2474. Mr. *Richards.*] That is the district assigned to you under the Metropolis Gas Act of 1860?—Yes.

2475. Which the Secretary of State can alter, or diminish, or enlarge, as he thinks proper, upon representations made to him?—Yes.

2476. Your

2476. Your attention has been directed to these subways; do you think it would be a safe or a desirable thing, in point of fact, to carry the gas pipes of your company into a subway of this sort?—I think it would not be.

2477. Do you apprehend danger from explosion?—Very great danger. As the gasworks are managed at present, both from the mains charged with gas, and the services to several houses, very large escapes do take place. If those escapes took place in a subway, the men working in them would undoubtedly be knocked down by those escapes; they would become perfectly insensible, and the escape would continue to a very great extent in the subway. From what I know of gas explosions, I believe, that supposing the men were employed in the manner in which they are employed at present, the escape would be sufficient to cause an explosion, which would entirely destroy the subway, and the houses, to a very large extent, on both sides of it.

2478. You conceive that pipes, laid in subways, would be liable to less leakage than they are now?—Certainly; considerably less.

2479. Do I understand you to say, that the consequences of that leakage would be much more fearful than they are now?—Yes; the leakage in a subway, being confined to a narrow space, would be very much more dangerous than at present.

2480. We are told that leakage now is, in fact, considerable; is every possible precaution taken by your company to prevent leakage?—Perhaps not every possible precaution to prevent leakage, but such precautions as labouring men will take. You cannot make them take beyond ordinary precaution. I believe no accident would have happened since the world began if extraordinary precautions were always adopted. We know that on ordinary occasions only ordinary precautions are taken.

2481. Will you state some of the causes of accident?—In connecting two mains together the mode of doing it is by a bladder. As the gas is turned off from the main which is charged the bladder is put in, and then it is filled with gas; and sometimes the bladder breaks, and sometimes the pressure of the gas will force the bladders on one side; and besides that, there are small leaks in the bladders. If any leakage takes place near where the men are, the men are suffocated by the escape, and they stagger as if they were drunk; it is then the custom to draw those men away and put other men there. That can very readily be done in the open air. I have known instances where 10 men, one after the other, are carried away suffocated as it were.

2482. *Chairman.*] A sort of fainting?—A sort of fainting; they recover soon, but are insensible for a time; if those men were rendered insensible in a subway they could not be carried away with such ease; the men would remain in the subway and die; fresh men could not easily take their places.

2483. Do you remember an explosion which took place in the year 1848?—Yes.

2484. What was that?—In the year 1848 there was an explosion which took place in Albany-street. The shop was a very small shop, but I mention it as showing what effect an extremely small explosion of gas will have. In the front shop of a small Berlin wool shop in Albany-street, there were the service and the meter; the boy, in moving the shutters of that shop, broke the service pipe in some way, and occasioned a leak; that leak continued, and half an hour after that leak commenced the master of the house passed through from the back room into the front with a candle in his hand. An explosion immediately took place. The back wall of the house was blown down, and a man and a woman were blown entirely through. The servant girl, who was standing in the front shop, was blown right across the street for more than 60 feet, and immediately killed: the railings on the opposite side of the street were smashed. Upwards of 4,000 panes of glass were broken, for a distance of more than a quarter of a mile on each side. I was told that through that explosion glass was broken, more than a mile off. The neighbourhing houses were very much shattered.

2485. That was an escape which took place in a short space of time?—A very short space of time; it took place within half an hour.

2486. Supposing gas companies are forced into a subway, and any damage were to happen to the pipes from any cause, would you consider it fair that the gas companies should be held responsible for that damage?—I think it is very hard that we should be driven into the subway at all against our wish; and then it is very hard, when we are driven into such a situation against our wish, to fine

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us if any accident occurs. The whole capital of the company would not answer one accident of the size that I contemplate.

2487. Have you all gone into the question of the cost which would be occasioned by the removing of pipes into subways?—No; that is more an engineering question. But I know there would be considerable cost, supposing a subway were already filled with mains, with the service pipes going through that subway, so as to make an extremely intricate network. Supposing I wish to take up a 12-inch main, which was laying there already, and substitute for it a 24-inch main, it would be extremely difficult to move such a main as that up this extremely confined subway, and then to lift it into its proper place. I think, in all probability, in laying that main in its proper place, accidents would occur. Very often, great escapes would take place. It must be recollected that where the passage is very much taken up with pipes, it would be extremely difficult to move a large main of that kind into its place, without serious accident occurring which might injure the men.

2488. You would not have the means of lifting them as you have in the case of ordinary trenches?—No; we can now sling them, and guide them, until they drop into their proper position, which we should be unable to do in laying pipes in subways.

2489. What are the size of your leading mains?—Twenty-four inches. We are about to lay a much larger main.

2490. Something has been said about an increase in the supply of gas; do you find that the demand for gas does increase considerably?—Very largely.

2491. It increases, I believe, at a greater ratio than the population?—I have not compared the two together; our ratio is about 7,000 a year, I should say.

2492. You cannot give us the per-centage?—Our whole rental is about 144,000 *l.*

2493. Have you gone at all into the question of the comparative cost, or have you not, with your engineer, of laying mains in the soil as at present, or laying them in the proposed subways?—The only way we could arrive at that is by taking the cost of our present opening of the ground and closing it in again, and the paving.

2494. Can you tell us at all what the cost of repairing your mains is at present?—The annual cost, including material and labour, and re-paving, and every thing, is put at about 1,000 *l.* a year.

2495. About how many miles of mains?—I should state, upon this point, that I have been rather startled by some evidence that I have just heard; I should have said, before I heard Mr. Innes' evidence, that the length of our mains was 134 miles. Mr. Innes put the length of his company's mains at upwards of 300 miles. I think our system is as large as his, and, therefore, very likely, I am mistaken; I must inquire further.

2496. *Chairman.*] Your income is about the same?—I think our mileage must be the same as the mileage of his company.

2497. Mr. *Richards.*] Your length of the streets must be more than that?—I come here prepared to say 134 miles; but, as I have said, it is very likely I am mistaken.

2498. In the result, may I ask you whether you are in favour of this experiment of subways, or do you think it desirable that matters should continue as they are?—If new modes of laying mains and new modes of laying service pipes could be invented, if they were found perfectly safe after five years' careful experiment in the open streets, so that the men could be properly trained to exercise these new methods, I think then something might be said in favour of subways; at present, I should think them extremely dangerous experiments.

2499. You have no object except to lay your mains in the most safe and least expensive way?—Certainly.

2500. Do you approve of the scheme of imposing a rental, which they suggest?—I think we should be losing money in laying our mains, and I think it would be unfair to charge us a rental.

2501. You have to supply gas now under penalties, according to the Metropolis Gas Act?—Yes.

2502. Upon requisition from any householders within a certain distance?—Yes.

Cross-examined by Mr. *Phinn*.

2503. What was your dividend last year?—Our dividend was 10 per cent.

2504. Had you any dividend besides, in the way of bonus for back profits?—No.

2505. Have you within the last two or three years?—No, none.

2506. You cannot divide above 10 per cent?—We cannot divide above 10 per cent; a large portion of our works are upon leasehold property, and the leases will very soon fall in; the consequence is, that the depreciation of our property is so great, that it leaves us no profits beyond 10 per cent. Indeed we should hardly have been justified in dividing 10 per cent. had we not made the fact of the depreciation of our property through the leases falling in clearly known to our shareholders.

2507. Then you cannot divide more than you are dividing now?—No.

2508. Then you will have to begin reducing the price of your gas?—Yes.

2509. So that if Parliament imposes on you anything with reference to these subways, it will stop the reduction in the price of gas?—I imagine it would under the present law.

2510. It probably will not affect your dividend, but reduce the price of gas?—That depends, because if we can make greater profits it would then fall upon the public; but if we could not make greater profits it would then fall upon our dividend.

2511. How long have you made 10 per cent.?—A year and a half.

2512. Are you putting by a good deal for depreciation?—Yes.

2513. What are you putting by per annum?—£. 14,000 last year was what we put by for depreciation of leases.

2514. Then if you had not that element you would have had to reduce the price of our gas?—We should have had to reduce our dividend, not the price of our gas.

2515. Supposing that you had not put that aside for depreciation, and had paid 10 per cent., that amount of 14,000 *l.* for depreciation would have had to go towards reducing the price of gas?—We are not putting aside for depreciation so much as we are entitled to put by for back dividends. We are mulcting our shareholders of their back dividends, in order to build new works.

2516. That you would be entitled to do for six years?—Yes.

2517. Your district is not affected by this Bill?—Not unless it applies to old streets.

2518. Do I understand you that, assuming a subway made and offered to you in your district, you would not under present circumstances put a pipe in that subway?—I should be afraid to do it until some new method had been in practice for four or five years, and until I was quite sure that our men were thoroughly trained to some new and safe method of connecting mains and services.

2519. I suppose a good many of your mains near the gas works are exposed, are they not?—Yes.

2520. Do you use any particular safety lamp in your works?—No.

2521. Never?—Never, I believe.

2522. As you are in the Fulham and Chelsea districts, I dare say you carry gas over the bridges?—Yes.

2523. By exposed pipes?—Some are exposed, and some in the pavement.

2524. That, practically, is a subway?—So they are.

2525. You have very little between the arch and the parapet?—Very little. There is another objection to a subway which I may mention. With the present system, when the pavement is taken up, it then becomes a perfectly open place, and my objections to subways arise from the danger of men working in confined space. The men are constantly made giddy with that sort of work. When that giddiness occurs in the open air, a man may be immediately pulled away and another substituted in his place; but that could not take place in a subway.

2526. Have you been down a subway?—Never.

2527. With regard to these bridges, do your pipes suffer from vibration at all?—They do to some extent.

2528. Have you ever heard of a pipe breaking?—I do not know.

2529. How many bridges do you pass?—We pass Waterloo Bridge. There

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is a small main over Westminster Bridge; there are two new mains over the new Lambeth Bridge; there are two mains over Vauxhall Bridge, and one over Fulham.

2530. You have pretty good experience?—Yes.

2531. Are they large mains?—I think 18 inches.

2532. You have had no accidents there?—We have had leakage there, which we have had to look to.

Re-examined by Mr. *Richards*.

2533. You say there is a certain amount of vibration?—Yes.

2534. Is the effect of vibration to loosen the joints, and not to break the pipes?—To loosen the joints.

2535. That would produce a leakage?—Yes.

2536. With regard to the trenches in which your pipes are laid over the bridges, whenever you have to repair the pipes, you take off the top of the trench?—Yes.

2537. That is like opening the lid of a box?—Yes.

2538. So that the pipe which lies below is, to all intents and purposes, an open thing?—Yes.

2539. A question has been asked you with reference to your dividends; how many years did the London Gas Company go on without paying a sixpence dividend?—Eleven years.

2540. Now you have been paying 10 per cent. for a year and a half?—Yes.

2541. Is that upon your original capital only?—Yes.

2542. Not on your preference capital?—No.

2543. The dividend is not so large as 10 per cent. on the preference capital?—It is only 6 per cent.

2544. You have deprived your shareholders at present of those back dividends which you are enabled, under the Metropolis Gas Act, to pay for six years?—Yes.

2545. That is to say, the Metropolis Gas Act allows you to make a 10 per cent. dividend?—If we converted our debt into bonds, we should then be entitled to pay 10 per cent.

[The Witness withdrew.

[Adjourned till To-morrow, at Twelve o'clock.

Veneris, 13° *die Maii*, 1864

MEMBERS PRESENT:

Mr. Du Pré.	Sir Baldwin Leighton.
Mr. Floyer.	Mr. Powell.
Viscount Grey de Wilton.	

SIR BALDWIN LEIGHTON, BART., IN THE CHAIR.

Frederick Joseph Bramwell, Esq., called again; Examined by Mr. *Wilkinson*.

F. J. Bramwell, Esq.

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2546. I THINK you wish to make some explanation with reference to an answer you gave in your examination the other day?—I do.

2547. I will read the question and answer to you as they appear, and will you give what explanation you think necessary. The question is, "What experience or knowledge is that founded upon?" It is Question No. 1880. The answer is, "It is founded upon a matter that I had estimated for." I would wish to correct the answer to this. "It is founded partly upon a matter that I had estimated for and partly upon other information." That is the sole correction I wish to make.

2548. It should say that it is partly upon other information supplied to you?—Yes.

[The Witness withdrew.

James Simpson, Esq., sworn; Examined by Mr. *Toulmin Smith*.

J. Simpson, Esq.

2549. YOU are are a Civil Engineer, I believe?—I am.

2550. And have had many years' experience?—I have been in practice upwards of 40 years.

2551. You are engineer to the Chelsea Waterworks Company, I believe?—I am.

2552. And also to the Lambeth Waterworks Company?—Yes.

2553. And you are also engineer to several other waterworks companies in different parts of the kingdom?—I am.

2554. Will you inform the Committee what is the district supplied by the Chelsea Waterworks Company?—The district supplied by the Chelsea Waterworks Company lies to the south and west of a line drawn from Northumberland House round by the National Gallery, including the barrack-yard at the back, through Pall Mall east, through Pall Mall on the left side, round by the Green Park, round by Hyde Park, including the Queen's Gardens and Kensington Palace, and so returning to the Kensington-road, near Albert Gate; and taking the line of the Old Brompton-road, it goes through Earl's-court, to the Thames, to the public house called the "Crab Tree." The river is, of course, the boundary on the other side.

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2555. What is the mileage of streets within the Chelsea Waterworks district?—I do not know exactly the mileage of streets; we have about 200 miles of pipes in them.

2556. What is the district supplied by the Lambeth Waterworks Company?—It is difficult to describe that, but I will endeavour to do so; it is bounded by a line drawn to the eastward of the Blackfriars-road, and passing near the Queen's Bench Prison, and to near Horsemonger-lane, and down the Kent-road, including the houses right and left, to the Canal Bridge; then the district southward of that, extends to Norwood, Croydon, Sydenham, Streatham, Balham, Clapham Park, and part of Clapham; and so, continuing down the road in Tooting, Mitcham, Merton, and to Kingston.

2557. How many miles are there within your supply district in Lambeth?—About 250 miles of pipe.

2558. The length of mileage in both cases is that of the pipes?—Yes.

2559. Mr. *Powell.*] Are they square miles?—No, linear miles.

2560. Mr. *Toulmin Smith.*] Are the pipes single or double?—They are in some cases double, and in some cases single.

2561. Are they double to a large extent?—They are.

2562. *Chairman.*] As I understand you, that they are 250 miles in length, not taking the double as two miles?—No, that is the length of the pipeage.

2563. Not of the streets?—No.

2564. And the same in regard to the Chelsea district?—Yes, the same.

2565. Have you any idea what your length is of streets, because I have always understood that this was the length of the streets that was supplied?—In the Chelsea district, the length of street in which one pipe is laid is about 70 miles, and the length of street in which two or more pipes are laid, is about 46 miles.

2566. That is in the case of Chelsea only?—Yes; that is in the case of Chelsea.

2567. Are there any with three pipes?—Yes.

2568. Mr. *Toulmin Smith.*] And there are some with four pipes, I think?—Yes; the 46 miles are those streets containing two, or more than two, pipes.

2569. Will you now state the same facts as to Lambeth?—In Lambeth we have 80 miles of street in which one pipe is laid, and we have 65 miles of street in which more than one pipe is laid.

2570. Have you attentively considered the Bill which is before this Committee?—I have.

2571. You have no prejudice upon the subject particularly; if you saw your way to the useful application of the subways by the companies, you would recommend your company, I presume, to use them?—Yes, I should; I can only say that I think I have introduced as many improvements in waterworks, not only in the general laying them out, but in the details, as most engineers; and, without being a creature of progress, I am fond of improvement, and I would adopt anything that I thought was advantageous to the company and the public.

2572. Is the use of pipes, either for gas or water in subways of some kind or other wholly a new thing to you at the present time, or have you had at any former time opportunities of looking at the question?—It is not a new thing to me.

2573. Will you state where you had opportunities of looking at the matter before?—About 12 years ago I was consulted by a French and English company, and asked to design a work to supply Paris with water. I went over there, and, I believe, had unusual facilities for examining the existing works. Amongst the rest, I felt it my duty to ascertain what the drainage works were, and then I stumbled upon a subway, or, rather, it was a sewer in one of the streets near Montmartre, where I found that a gas pipe had been laid.

2574. What was the result?—I made further inquiries, and then I found that some few water pipes had been laid there, and I was anxious to enter that particular place, but I found M. Corôt, the engineer, who accompanied me. He said, "You must be cautious; we have had people hurt, and if you smell the gas, do not go in." I went up there with him, and although, as we descended the staircase, there was a good deal of air passing through it, I did smell the gas, and, at his instigation, I desisted from going in.

2575. Had

2575. Had you another opportunity of going in offered to you?—Yes; he said, "I will do what I can to ventilate it by the time you return to Paris." I went away, and returned in about three weeks, and made another attempt, but it was still very bad.

2576. Was this subway or sewer at Paris, in which the gas and water pipes were laid, at all ventilated?—It was ventilated; there was a considerable current of air in it. As I understood him, there was a ventilation from the houses, and through the stairs I went down there was a considerable wind passing.

2577. Notwithstanding that, both he and yourself found it unsafe to enter?—The smell of carboniacal gas was so distinct and so powerful that I did not persevere after smelling it. M. Corôt carried his observations further than I did, although, of course, I was very anxious to ascertain every particular. He was a man of experience, a mechanical engineer, who had evidently attended to the details, and he spoke so strongly against the possibility of carrying out the system, that he evidently would have agreed to what he did afterwards, with very great reluctance; in fact, I saw him afterwards in England once, and once in Paris, and he said that what he did was done with great reluctance.

2578. As an engineer of water works companies, I presume you have felt it your duty to inquire particularly as to the leakage from the gas pipes, which might affect the water?—Yes.

2579. You have paid particular attention to the different manners in which gas may leak from the joints?—Yes.

2580. Have you found, from inquiries, that the gas pipes are liable to leakages arising in any other manner than from the joints which we have heard of before the Committee?—It is not only from the joints, it is from the iron itself. A pipe may be water-tight, but it will not be gas-tight.

2581. Would you explain how it is that the gas can escape from the pipes by any other means than what is commonly called leakage at the joints?—From my experience, I know that in the casting of pipes, if they are removed from the moulds when they are in a heated state, too hot, in fact, and put on damp sand, you will know the blemish by what we call sand porosity; the particles of the iron may not be actually separated; they may continue in contact, but they are not sufficiently in contact to prevent the leakage of gas; that is one cause; and besides that, there is very often a decided sand porosity when the sand is mixed with the metal. In other cases, we have air bubbles and unsound castings, which you cannot find out. One great source of leakage is the difficulty of getting gas pipes equal; the gas pipes being cast rather light, it is difficult to get them equally cast; they may be thick on one side, and very thin on the other.

2582. When a gas pipe is laid in the earth, and left some time, do you find any phenomena, when the earth is dug up, which confirm that view?—In most instances, we find the soil all discoloured; almost quite black round it; in fact, those who are accustomed to it can tell the difference between a gas and a water pipe outside.

2583. Is that discolouration chiefly at the joints?—No; it pervades the whole line of pipe.

2584. Is it known that water will pass even through large iron water pipes when they are subjected to great pressure?—Yes.

2585. Have you known instances where heavy cylinders cast purposely to resist water pressure, have had water sent through them, and been rejected in consequence?—Yes; I have rejected hundreds of them in my own practice; in fact, I have made many experiments to ascertain what the effect of bringing a great pressure to bear upon iron cylinders was; I had great opportunities of doing so in the early part of my life, from being intimate with the late Messrs. Bramah, the elder of whom was the inventor of the hydraulic water press by which all the great proofs are made; there was hardly a trial made some years ago of which I was not a witness.

2586. Is it not the case, that when anything has to be cast to resist pressure, it is cast with a heavier head of metal?—Yes.

2587. That precaution is not taken in the case of ordinary gas and water pipes?—Not to the same extent; of late years they have been much improved by casting them vertically instead of horizontally; that is not the case with all; some are still cast at an angle of 45 degrees.

2588. Whilst others are cast perpendicularly?—Yes.

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2589. The ground being thus saturated with the gas, does not the operation of that affect the water to some extent, whether the pipes are laid in or out of the subway?—My opinion is that we should be liable to it in the subway to a very great extent indeed.

2590. Would not the escape of gas from the pipes in the subway be more than out of the subway where the porosity of the gas pipes is somewhat hindered by the close packing of the earth?—Yes; in clay soils that is effectual; it will divert it from the water pipes; in some of the original Acts they were compelled to lay their pipes coated with clay, but that is not always so. It is not only from the pipes themselves, but we have many contingencies to meet in an extended system of pipeage laid side by side, which we should have to guard against. I may instance a case in the Brompton-road, some years ago, when thieves got into an empty house and cut all the fittings; we were some days before we discovered it; the gas escaped and forced its way into the drains, and got into the street sewers, and thence into our pipes, and we had about 600 or 700 yards of pipes affected in that way.

2591. Touching this porosity of iron, that being a leakage which is almost imperceptible, no care and no inspection in the subways would help you, would it?—No.

2592. Consequently the danger of explosions there would be continual?—Yes.

2593. Are there not other contingencies which would not only be found dangerous to life, in case of explosion, but also by suffocation, and which might affect the sensibility of the workmen?—Yes, I can imagine states of atmosphere there in which it would be impossible for them to exist. I would apply that observation not only to gas pipes, because we have had instances in the district where, in sewers 200 yards from a gas pipe, there has been loss of life in the street.

2594. A loss of life through the filtration of gas?—Some filtration of gas; it was stated to have been sulphuretted hydrogen, and some other deleterious gas.

2595. That sulphuretted hydrogen was generated in the sewer, of course; we are speaking of gas now?—You say that it was generated in the sewer; I say, from my investigation, that it was not, and, I believe, the evidence at the inquest bore out my observation; I lived near the place, and used to pass by the sewer twice a day; it was a new street; it is now called Cambridge-street; at that time it was called Kenilworth-street, but the builders altered the name, because, of course, it would not do, after such an occurrence, to go and live in that street; that was rather a remarkable case; two sewer men entered that sewer, one after the other, and they must have been in two or three hours before any alarm took place about their being lost; a policeman then entered, and, something like an hour afterwards, a doctor was sent for, a practitioner in the neighbourhood, who came, lancet in hand, as it was described to me, and he entered the sewer, and they heard him fall, and those four lives were sacrificed.

2596. How long ago was that?—I think it was about 1849.

2597. That is a case of suffocation, not of explosion from the application of a light?—It is a case of suffocation, and a very extraordinary case, because the sewer's mouth was open.

2598. There was ventilation there, and that ventilation might have been expected to cure the difficulty?—It was in a street then forming; the carcases of the houses stood in an unfinished state; certainly, that was a very remarkable case.

2599. Do you apprehend that if a light had been applied, instead of suffocated they would have been blown up?—Very probably.

2600. Is that not likelyto happen in a subway under similar circumstances?—I should be afraid of it.

2601. The men, of course, in using their tools, are constantly in the habit of striking sparks, from the contact with the metals?—They do.

2602. Would not the results of that be equally fatal?—Yes, inasmuch as it is now known, from experiments of late years, that coal gas explodes at a very low temperature.

2603. What is your opinion of the use of the Davy lamp, or the beautiful invention

vention that we have heard of so much in this room; do you think that they would be found useful in subways?—I think they would require to be used with very great care; I know I have been in positions in mines when I have held my lamp up and down, and seen the effect of it, and have been cautioned by the men; and from some publications of Dr. Franklin, in which he cautions the gas engineers about the use of the safety lamp, I question whether it is a safe thing to use with coal gas; the gas in mines is not so explosive in comparison with coal gas, especially olefiant gas.

2604. It is not so explosive?—No.

2605. Apart from the explosiveness of the gas, and apart from the improbability that the men would be willing to use those artificial lights, is the work likely to be done as well by those artificial lights in the subways as the work done in the daylight?—No.

2606. We have heard a good deal about the perfection with which the work must be done; what do you think of the subways from that point of view?—The extent of it is so great that perfection is an absolute impossibility. Take the thing up from the commencement, we will say at the foundry, at the time of the casting of the pipes; we will admit that that has been supervised, and that the contractor is bound to prove them with a 300 feet pressure. That pressure is on for so short a time necessarily for the quantity that has to be done, that it is really not worth employing the time about. Then every time the pipes are moved they may be compared to glass bottles; they are liable to injury, and you will readily conceive that, because very few of us know the effects of the blow of a four pound hammer. We know it is destructive, but we do not know the extent it will go to.

2607. You are more likely to see anything, that may need to be seen, in broad daylight than in places illuminated with artificial light?—No doubt. Now, with artificial light you can have no idea of the difficulty which we find of getting the work done properly. Then afterwards, from the pressure of the water and from gas leakages the difficulty is very great indeed; with the most careful superintendence, and with plenty of it, we do not at all times succeed.

2608. Even with men whom you consider good and careful workmen, you experience those difficulties?—Yes, with men in our own employment, not contractor's workmen, we still have a difficulty.

2609. Do you think that if men are sent to work in the subways, they are likely to work for the same wages as they do now?—No; I should expect to pay them more.

2610. Does it follow that your work will cost more and be worse done in the subways?—I think it is very probable, indeed, unless we make them take it out and out again; taking the general line of the subway, I have no doubt that a great deal of defective work will be found in it.

2611. I understand the reason of that to be, that the work done by artificial light is not likely to be so well done as in the daylight; is not that the reason?—Yes.

2612. The wages are higher, and the work will be less effectively done, because it must be done by artificial light; is that the case?—Yes.

2613. *Chairman.*] Do you mean to say that you pay more for work done by artificial light than for work done in the daylight?—Not only for work done by artificial light; but for work done underground.

2614. Mr. *Toulmin Smith.*] It is the usual habit, is it not, to charge more for work done underground, whether it is work done in a mining country, or anywhere else?—I have never known many instances of it; some years ago I made a small subway for the Commissioners of Her Majesty's Parks for crossing Hyde Park Corner, for conveying the water in it which takes the spring water to Buckingham Palace.

2615. Did you pay higher wages for that work?—Yes, the men had all sixpence a day more.

2616. You spoke of the leakage from gas pipes in the subways, at present the surface of the road being hard; does the leakage from the gas pipes, when they are laid in the streets, come upwards?—No. Most of the streets in London are very hard indeed; they are comparatively impervious.

2617. Upon the surface?—Yes; in consequence of that, the gas is forced downwards.

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2618. In consequence of that, is it likely to reach the foundations of those subways?—I have no doubt that wherever there was less resistance in the soil, there the gas would go, and that would follow.

2619. How far do you say it was from the gas pipes to the sewer that was filled with gas, which you have spoken of?—Two hundred yards; when I say it was filled with gas, it was not coal gas, you understand.

2620. But I thought you said your opinion was, that it was an artificial gas in some way connected with the gas pipes?—There was a statement at the time that it was in consequence of the blue billy, the gas refuse, being deposited there.

2621. From your experience in underground works, do you think it probable that the gas prevented from rising into the air from the hardness of the crust of the streets would descend as low as the foundations of those subways?—Yes; I have found it go very great distances, and very deep sometimes.

2622. In your own experience?—Yes; I have found it so in my own experience. This is not a thing of yesterday with me, for upwards of 35 years we have had to contend with difficulties, arising from the leakages of gas.

2623. In that case, would the gas get into the subway from the outside?—No doubt of it; and I think it will get in by those openings which have been talked of as now existing, and which are, they say, to be shut up; if they are left in, I believe that will be one source whence they will get a great deal of gas; I mean the openings which they speak of from the side passages through into the cellars.

2624. You think they will get gas instead of getting fresh air, as they suggest by those openings?—I should say so; I have known hundreds of instances of servants being burnt from going into the vaults for coals; in Parliament-street the instances of that were very numerous a few years ago.

2625. Do you think the walls of those subways are likely to subside at all by degrees; do you think that they will be perfectly sound?—It will depend entirely upon how they are built; they will have, no doubt, to pass through a great deal of unsound ground, and unless the foundation is laid deep enough, they will continue to subside.

2626. Is the heavy traffic which passes over the streets of the metropolis, do you think, likely to have any effect in that respect?—I think it will.

2627. If there is any subsidence at all, from whatever cause, will that afford another means by which the gas can enter the subways?—Yes.

2628. Although the pipes are not there?—Yes; it occurs in the sewers; I have seen many sewers with settlements in them.

2629. You have seen many instances of settlements in the London sewers?—Yes.

2630. Will you state some instances of sewers, within your own knowledge, in which cracks and subsidence have taken place?—Yes; some years ago I was in a sewer in the King's-road, Chelsea, and in Lawrence street, in which I observed that.

2631. What size was that sewer?—I think it was about three feet wide and four feet six inches high.

2632. What did you find there?—There were a great many settlements in the sewer, and the bricks had parted.

2633. From the nature of the construction of a sewer which has an arch below as well as an arch above, is that less likely to meet with accidents of that sort than an upright wall which we see is the construction of these subways?—It is a very similar structure; almost identical.

2634. With respect to the ventilation, have you had opportunities of examining those subways?—No; I watched them during their progress; I have not been in them.

2635. You know what means of access for air there are near the surface, do you not?—Yes.

2636. Do you consider, from your experience, that that is sufficient to keep them perfectly ventilated?—No, not at all times and seasons. The weather lately has been very favourable for ventilation; but take a lowering or a foggy morning; with the fogs we have in London those shafts would be utterly useless; in fact, I wonder they call them shafts, they are of no use.

2637. They speak of two shafts at the end, but those between are only gratings. They only call those shafts which have the handsome lamps for the benefit of the gas companies at the end of three-quarters of a mile, but the others are not shafts?

shafts?—Certainly, I cannot call them shafts. From the drawing I saw here, they looked to me like a common lamp-post; but as they were six inches diameter inside, that would be an unusual size for the interior of a lamp-post. Now I can tell them my experience; I believe I have made, as an amateur, as many experiments upon ventilation, and pursued it as far as any man could. I have had opportunities of communication with some of the best ventilators, Dr. Reid and Dr. Arnott, and I am surprised that anybody should attempt to ventilate any place whatever with so small a shaft. The friction of air in comparison with the volume is very great, and you will find that small trunks and small shafts are utterly fallacious and useless.

2638. Supposing those shafts were a foot in diameter, instead of six inches, would the two shafts, at a distance of 3,300 feet from one another, be sufficient to ensure ventilation?—The mining engineers will tell you more about that than I can, but I know their practice teaches them, that if they cannot command a current of one and a half to two miles an hour, their ventilators are useless.

2639. We have now in the Southwark-street, and also, I believe, in the new Covent Garden-street, a subway which has several of those side passages more or less opened, and has also the favourable condition that there are no houses built up on both sides; what is your opinion as to the change that will be likely to take place in the ventilation of either of those subways when all the side passages are completed, with the houses against them, and when tall houses rise up on each side of the street, so as to obstruct what free current of air there may be upon the surface of the street?—There is no doubt, in my opinion, that it will tend to reduce the ventilation; then, as you build the houses, the air in the subways will come to something more approaching a quiescent state.

2640. It would lessen the amount of ventilation which now exists, would it not?—Yes.

2641. The present state of ventilation has been described by one of the promoters' witnesses to be not perfect, but good in one subway and fair in another; did you hear that?—Yes.

2642. Now take another condition of things. When not only the houses have risen on each side, and the side passages have been stopped, but when there are also a number of pipes filling the subway, would that again tend to check the ventilation?—It would not improve it.

2643. Do you think that there is likely to be a sufficient motion of air in the subways to secure an efficient ventilation?—No; not as they are at present proposed to be constructed, unless some larger means are used; in fact, to accomplish the ventilation, I do not admit that that is a ventilation for all seasons and for all hours.

2644. You do not admit the ventilation now existing by gratings and shafts to be a true ventilation for all seasons and all hours?—Certainly not.

2645. Supposing that, after the evidence which has been given or which may be given to this Committee, added to your own evidence, it may be felt that gas-pipes can be put safely within the subways, will not the obstructions which are complained of still remain in the streets of London?—They will remain, of course, as far as gas is concerned; I think, to some extent, they are wrong in supposing that the obstructions will be entirely stopped, because in the case of the Chelsea Waterworks Company we now have it under consideration to duplicate the pipes which we laid 12 years ago; we shall put larger pipes; and if we were in a subway, that would require a larger subway, and then it would be in fact making another subway or enlarging it. Supposing a subway had been constructed which wanted enlargement, I need not say that that would stop a whole street for weeks and weeks, and perhaps for months.

2646. You heard, did you not, the returns and the evidence given as to the number of openings that are made for the purposes of the gas and water companies?—Yes.

2647. As a man familiar with the openings made for those purposes, can you give the Committee a little information as to what the openings are which have been heaped up, but of which we have had no descriptive account?—Many of them are only two feet square or a yard square; a large number of them are the reparations of plug-boxes, the adjustment of plug-boxes and cock-boxes, and hydrants, as they are called, or cocks.

2648. At what time of the day are those works usually done?—The workmen

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go out early in the morning to get as much done as they can before the streets are full.

The *Chairman* stated that the Committee wished for more evidence than had hitherto been given with respect to the nature and objects of the opening of the streets.

2649. Mr. *Toulmin Smith.*] Is it really at all difficult to get the returns of the actual amount of openings?—No; we know the number of openings, and we know more than that.

2650. Is it not the custom of the gas and water companies to send a ticket upon all occasions, upon which is stated the number of yards which they intend and want to open upon a particular occasion?—Yes; we do more than that; we send a notice after every work of the kind has been done, with the different dimensions marked upon it.

2651. So that the vestries and the Metropolitan Board of Works have the precise facts, in every single case, within their own hands and under their own control, and could have laid them before the Committee if they had chosen to do so?—Yes.

2652. Instead of that, they only give the lump number of 5,000, which expresses nothing in reality?—Exactly.

2653. *Chairman.*] Do you say that the Metropolitan Board of Works have the returns?—It is the vestries who have them.

2654. Mr. *Toulmin Smith.*] Will you give the Committee any information, with as much exactitude and precision as you are able, as to what proportion out of the 5,000 would be those small openings which you have mentioned?—I can only speak as regards our own district, and I would rather give, without reference to the 5,000, the number for the last three years.

2655. Will you confine it to your own district?—Yes; I will take the Chelsea district. In 1861 there were 1,163 openings; there may be a little more; I may be accused of selecting a year, and, therefore, I will take three years; in the next year, 1862, there were 1,090 openings, and, in 1863, 1,271.

2656. Viscount *Grey de Wilton.*] That is the number of openings?—Yes, the openings for repairs.

2657. *Chairman.*] Does that include every opening?—Yes, for repairs.

2658. Mr. *Toulmin Smith.*] What would be the size of those openings?—They would be of various sizes.

2659. Will you describe the character of those openings; you say they are for repairs?—Yes.

2660. What would be the size of the openings, and the time they would take?—The larger proportion, or about one half, would be under two yards.

2661. That would be, at least, one half of them?—Yes.

2662. I suppose you would have no difficulty, if the Committee wished it, in giving them the exact return of them, arranged in tables according to the size, from the smallest to the largest, would you?—I believe we have got it so particularly that every day and hour the dimensions of the street, the number of the house to which they were opposite, and, in short, everything could be given. I have had it kept very elaborately indeed.

2663. Mr. *Powell.*] Do you know the area of the streets under which you have power to lay the pipes?—I have not the least idea.

2664. Mr. *Toulmin Smith.*] Have you ever, in the course of any works necessary for either of the companies with which you are connected, obstructed the streets to anything like the extent that the Metropolitan Board of Works is obstructing the streets at the present time?—I have never copied the Metropolitan Board of Works; I have taken very great care to prevent more ground being opened at a time than was necessary; and, in a shop neighbourhood, I take very good care that they shall have proper plank bridges, with hand-rails across. In fact, we do everything we possibly can to accommodate the public, and prevent annoyance, as far as we can.

2665. When you are obliged to cause the public some inconvenience, you protect them against accident, do you not?—We do.

2666. Is it the fact that the openings in the street are more often, from the nature of the supply, necessary for gas than for water?—That is the result of my observation; they are much more frequently necessary for gas.

2667. Would

2667. Would you inform the Committee how long the water mains usually last when they are laid in the ground?—Their lasting far exceeds my memory; I know we have some pipes, of a peculiarly good iron, which were laid down in the year 1784, in the Chelsea district, which are in use now.

2668. That is 80 years ago?—That is 80 years ago; and, speaking from my own observation, I should date their lasting in the case of water pipes which have been good to begin with, and properly laid, at about a century.

2669. There are not many persons who would be likely to be obstructed by the laying down of fresh pipes in the place of those which are now being laid down, who are now living, I presume?—I think not.

2670. The water pipes are made of stronger iron, and thicker than the gas pipes, are they not?—They are.

2671. In a case of that kind you would not have for a century to obstruct the public by laying new pipes, unless it was necessary for the public accommodation to increase the supply?—No. As regards the main pipes I very much doubt the propriety of putting them in a subway, as regards the expense, because, to refer to a case in point, we laid something like six miles of 24-inch mains when the new works came in the parish of St. Mary, Fulham, and St. Luke's, Chelsea, and three miles of 12-inch main, and I never knew a leak in those mains, though they have been laid 12 years.

2672. Then it is not necessary, on account of any accident or imperfect work in the laying of those pipes, to cause any nuisance to the public by opening the roads?—No.

2673. Supposing the pipes should ever be laid in a subway, would that avoid the opening of the roads above for many purposes connected with the pipes?—No.

2674. There would be fire-plugs and air-cocks?—They will all be surface operations that will still open above.

2675. Will you explain to the Committee, thoroughly, why it is necessary that these fire-plugs, and so on, must have communication with the outer surface?—All the fire-plugs and the hand-plugs, in order to cleanse pipes, must be brought to the surface to accomplish the drainage and to pass the water off; all the hand-plugs are used just the same as fire-plugs; the cock-boxes will remain. We must bring them up to the surface, because I do not think that it is practicable to do as they talked of doing, namely, to have a man in the subways to turn on the water.

2676. Supposing they could have a man in the subways to turn on the water, would that do away with the necessity of fire-plugs coming to the surface?—No.

2677. There are difficulties arising from that very cause if the pipes are in the subways, are there not?—Yes; the junctions will be troublesome to make, and so far as these junctions pass through the brickwork with the heavy traffic of this Metropolis, we shall never be able to keep them together.

2678. The trembling of the ground, caused by the heavy traffic, would affect them?—Yes; there is a considerable tremulous motion upon them. The traffic of late years has considerably altered its character. Now, early in the morning we have, coming down from the railways, six ton waggons, going at the rate of six miles an hour.

2679. Are you aware that, by an Act which was passed a year or two ago, that heavy traffic was obliged to go at night, so that we do not know, when we get up in the morning, what has been passing in the streets at night?—No; it has been a subject of conversation between me and some of the surveyors of pavements. You can see the effect of these waggons, and see that they destroy the streets very much, because the concussion of a waggon going at six miles an hour, and carrying six tons, is a very serious thing, much more so than the old waggons carrying three or four tons, and going at about four miles an hour.

2680. Mr. *Powell.*] How many horses have they?—Three or four horses generally, but six sometimes.

2681. Mr. *Toulmin Smith.*] There are traction engines also?—Yes.

2682. Those are extensively used in the streets of London, are they not?—I have not seen them extensively used; I have seen them; but we have occasionally very heavy steam carriages in London.

2683. Leaving that question, and coming to the arrangement of the pipes within these subways, in your Chelsea Waterworks district, do you not often use, in some streets, more than one pipe?—Yes.

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The *Chairman* stated that the Committee did not consider it necessary to go into evidence, at length, upon the Chelsea district.

Mr. *Toulmin Smith* inquired whether the Committee wished to limit the examination to those streets in which subways were already existing, or authorised to be constructed.

Mr. *Phinn* stated that, with a view to an exact understanding of the wishes expressed by the Committee, the Promoters had classified the subways to which the Bill referred, thus: first, actual subways; secondly, authorised subways; thirdly, subways in new streets prospective; and fourthly, subways in old streets prospective. He further stated that the Holborn Improvement Bill, which had passed the House of Lords, contained a clause, enabling the Corporation to construct a subway, with permissive powers to the companies.

The Committee-room was cleared.

After a short time, the Counsel and parties were again called in.

The *Chairman* stated that the Committee wished to inquire of the promoters whether they would consent to confine the Bill, supposing the Committee hereafter to be of opinion that the preamble was proved, to the subways in the Southwark-street, the Covent Garden-street, the Thames Embankment, and the New Cannon-street.

Mr. *Phinn* stated that he wished to consult the Board before replying to the question.

The *Chairman* stated that the examination must therefore be continued without the limitation to the four streets named by the Committee.

2684. Mr. *Toulmin Smith.*] (to the *Witness*). What is the size of the main pipes of the Lambeth Works?—Thirty inches is our largest main.

2685. What is the size of the largest mains of the Chelsea Water Works?—They are of the same diameter.

2686. In the case of the Chelsea Works, do you use more than one pipe in the streets for the supply of different qualities of water?—Yes.

2687. One is of filtered water, and the other is of unfiltered water?—Yes.

2688. If you had the use of the subways, would it be necessary also to have two pipes for the same reason?—It would.

2689. What room do you consider it would be necessary to have round each of the pipes, in order to have access sufficient to joint them, and repair them when necessary?—Twelve inches was spoken of, and I do not think that is quite sufficient; I think we ought to have 12 inches clear of the sockets.

2690. By how much does the socket increase the diameter of the pipe?—It would increase the diameter of a 12-inch pipe, measuring it from the outside, about six inches.

2691. A 30-inch pipe would become practically a 36-inch pipe, for the purposes you are naming?—Yes, at least that; a 36-inch pipe would become a 38-inch pipe; it is thicker than the 12-inch pipe.

2692. Would it be necessary to have that distance between the wall and the pipe as well as between the pipe and all other pipes in the neighbourhood?—Yes, at least that distance; it would be better to put the larger pipe in more towards the centre of the subway.

2693. Will you address yourself to the question of the facilities for getting these pipes into the subways; have you considered that question?—I have.

2694. Do you think it will be an easy matter to get those large pipes into the subways?—No, it will not be an easy matter. We have so much left to devise for ourselves; this subway, as it has been put forward, and as it has been constructed, is such a bare affair that we must devise our own plans to make the subway what I should call workable.

2695. How many of these 30-inch pipes would be necessary to construct a main of three quarters of a mile long for such a street as Southwark-street?—They would be either nine or 12 feet long; I do not exactly remember the length of Southwark-street.

2696. I believe it is 3,300 feet long—two-thirds of a mile. We have heard that the reason why these subways will be so useful is that they will get rid of the

the obstructions to the streets; do you not think that a great obstruction would be caused by accumulating in one place a sufficient number of these 30-inch pipes waiting to be got down into these subways?—They must either accumulate there, or be brought from time to time before they are put down.

2697. In either case causing great obstruction?—Yes; in the case of such large pipes as those, I think it would be better to contemplate an opening in the centre of the street, and to hoard it round with fencing and lower the pipe direct.

2697*. That would be temporary?—Yes.

2698. Taking the pipes as being safely lodged inside the subway, would the construction of your mains, the jointing and so on, be a matter you think free from difficulty?—No, there would be a great deal of difficulty in it.

2699. You expect it to be an expensive work?—As far as my experience of laying pipes under the same circumstances has gone, I should say that the expense has ranged from 18 to 25 per cent. in excess.

2700. In excess of the present mode of laying?—Yes, in excess of the present mode. I have never got so much work done in an underground subway as upon the surface.

2701. Have you considered in detail the relative expense?—Yes.

2702. The result of that is, that to lay the pipes in the subway originally will cost from 18 to 20 per cent. more than to lay them in the ground?—From 18 to 25 per cent. more.

2703. You are speaking of laying pipes in the ordinary way upon the level?—Yes, upon a surface trench.

2704. And with arrangements by which the flow will be continuous like the arterian system between the different pipes, I apprehend?—Yes.

2705. Will you look at that sketch (*handing a Sketch to the Witness*). Supposing that network to represent streets now existing with your mains, those mains now intercommunicate, according to the most convenient mode of providing a flow of water to all the parts, I apprehend?—Yes.

2706. Supposing what these gentlemen call a new street is made, which may be said to be represented by that brown line, will not the effect of that be to dislocate the whole system of the arrangements of your pipes and water supply for that part?—Yes, unless the subway is made entirely underneath them; and, of course, that will be at too great a depth. In the case of Southwark-street it is a question with me, knowing what height the water flows to at high tides in that part, whether it is not too deep now. It is true that the main drainage may have a considerable effect upon that district, but that is one of the points to be considered. It would be a very bad thing to have pipes laid where they will be subject to being under water at any time.

2707. Viscount *Grey de Wilton.*] You mean in the subways, do you not?—Yes.

2708. Mr. *Toulmin Smith.*] Looking at that new street, as made with your own system of pipes still remaining, you must either carry them above the subway, into the subway, or under the subway?—Yes, or through it. The probability is, that with a work like this, we should have to cut the whole of these pipes; in fact, re-arrange them, and alter the plans entirely.

2709. So that, although this was a new street, it would impose upon you very great difficulties for the re-arrangement of your system at the ends of the streets that remained untouched?—Yes.

2710. In case you wanted to communicate from those streets into the subway, if you had the pipes in the subway, would not you be obliged to make inverted syphons; there must be a bend in the pipes?—Yes.

2711. Would not that affect the flow of the water?—It would affect it; a great many of them would be very objectionable. Of late years we have known this, that the nearer we can adhere to lines in pipes, both horizontally and vertically, the better; more especially we avoid vertical bends, because they are, in reality, dips; we find that, even with filtered water, accumulations are likely to take place there; if I can possibly avoid a dip I invariably do it.

2712. Do they not often give you great trouble?—We have a great deal of trouble with them; we find that deposits form there, and we get dirty water.

2713. Are you obliged to apply special contrivances to free yourselves from those annoyances?—Yes.

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2714. Would it not be necessary to have special castings designed to meet those circumstances?—Yes.

2715. Which will involve cost, as well as considerable difficulty?—Yes, in working into a system of subways we must alter our present system very much in parts. I look upon it as a mechanical puzzle, which will not be done the first time, or the second time; there will be many trials before it is accomplished.

2716. So that, although we have been informed by other witnesses that these difficulties can be overcome without difficulty, you think it will be very difficult to overcome them?—Yes.

2717. The difficulties that have been stated are that this will cause a change of levels which will require newly-designed pipes?—Yes.

2718. To bring the matter clearly before the Committee, are you not forced and compelled, under the Acts of Parliament which now grant you your powers, to supply water, if a certain number of persons in the district apply to you to do so?—Yes.

2719. So that if a street is made, and your pipes dislocated, you would be under the necessity of finding some means of communicating with the houses, or be liable to penalties?—Yes; it is not exactly any persons associating together that is required. I do not remember the words of the clause, but if they come and tender the money we are bound to supply any one individual.

2720. So that it will not be a matter of option whether you will encounter these difficulties; you will be obliged to do it to meet the requirements of the Act?—Yes; for instance, speaking of the difficulties, it is a very common occurrence; we have a good deal of difficulty at times with what we call air-locks in mains, and in service pipes, too. though they are not so frequent in service pipes; but where we have them, and the air accumulates, it is to all intents and purposes a solid body; it is compressed, and there is no motion.

2721. As far as the necessity of your applying force to it goes, it is a solid body?—Yes.

2722. That is likely to occur much more when you have these tortuous mains, is not it?—Yes.

2723. Do you think that the frost would be likely to affect your water pipes, large or small?—I think our mains would be tolerably safe, because there would be motion in them, but the out services would not.

2724. You mean, that the service pipes to the houses would be liable to freeze, and to thaw again, and then to burst?—Yes, assuming that you have sufficient ventilation in the subway. I have no doubt there would be freezing going on. We have very similar things to these tunnels at our works; we have had them at our old works; we had a great deal of trouble with them. We were accustomed to put litter upon them, and by neglecting that in 1861 our main supplier was frozen; it was a mass of ice.

2725. Would not the increased efficiency of the ventilation in itself be a means of greater liability to frost?—Yes, no doubt.

2726. So that, what would be a good thing in one respect would be an increase of evil in another?—Yes; pipes under gateways, where there is a current of air, burst frequently.

2727. Pipes now sometimes burst in the streets, do they not?—Yes.

2728. When they burst in the streets, you can immediately see them, can you not?—Yes.

2729. I think you have seen the New River Company afford us fountains rising 10 feet in the air sometimes?—Yes.

2730. If that had happened at night in a subway, can you give any idea of the results that would have been found the next morning?—I do not exactly understand the construction of the subway; it is put so barely before us; take Southwark-street, for instance; I saw no drainage there.

2731. Viscount *Grey de Wilton*.] Did you see no gratings in the floor of the Southwark-street subway?—No; I was not aware that they were constructed; but supposing they are constructed, we must have something besides; because the gravel at the bottom would be all washed into them, and they would be stopped up. Mr. Tarbottom, in explaining the subways at Nottingham, seemed to have appreciated the difficulty, and provided for it.

2732. The floor is covered with gravel at Southwark-street?—Yes; but it would be washed away.

2733. Mr. *Toulmin Smith*.] Supposing there were openings into the sewer, would

would that improve the sweetness of the air?—They must trap them, and if they do not keep the water down, there would be no traps at all; it would be useless.

2734. A regular supply of water is more important to the inhabitants of London than that of gas even, is it not?—Yes.

2735. You can get a wax candle; but you cannot boil a potato without water, I suppose?—No.

2736. What would be the comparative case of repair if there were a bursting of a water pipe in the open air, or in a subway; in the open air you can immediately dig round that pipe, and renew it in a short time; but, first of all, you have to get into the flooded subway before you can do anything?—Yes; the one may occupy a few hours, and the other, many days.

2737. Therefore, the public would be kept out of the supply of water for that time?—That is one of the objections, and to my mind a most serious objection; because to leave a district without water, in case of fire occurring, is very serious.

2738. Following out the same consequences, arising solely from a subway in case of flooding; in case of the bursting of a pipe in the street, it flows down into the sewer, and does not injure the houses?—Yes.

2739. If it burst in the subway, would not the houses be injured?—Yes; I think that is very serious, particularly in some places, because grocers and dry salters have very valuable property in the basement; their kitchens are generally at the top of the house; they turn their basement into a warehouse. We have had sometimes to pay damages when they said we had flooded them.

2740. Have you now to pay damages for flooding?—Yes.

2741. Do you think that your liability to paying damages would, under those circumstances, be greatly increased?—I do.

2742. Do you think the Metropolitan Board of Works would be willing to pay the damages forced upon you?—That is one of the things in the system which I submit ought to be defined; we ought to know who is to pay the damages, because, according to one decision, the companies have been held liable in the first instance, and then they say they have a remedy against the parties who do wrong, but that is not a very practical way of going to work.

2743. Have you considered the results of the liability of flooding from frost or any other cause, or from the effect of an explosion of gas upon the pipes arranged around it?—It would depend entirely upon the extent of the explosion; it might of course disarrange the whole of the pipes; of course, if the water pipes burst by such an explosion, the water would come out very fast indeed.

2744. The subways would make you liable to that danger?—Yes.

2745. Have you considered the cost of a subway of a proper size to receive the pipes which would be necessary in a street like the Southwark-street?—I have made some estimates of them; they come to abont 7 *l.* 10 *s.* a foot.

2746. *Chairman.*] What is that for?—For a subway of a sufficient size to receive the pipes, which, in a street like the Southwark-street, would be essential for the supply of the street; my estimate was made for a leading street; I considered that street very likely to become a leading street.

2747. Mr. *Toulmin Smith.*] Do not you think that Southwark-street is a street through which leading mains or through mains will have to be carried, to take the water to distant parts, as well as the supply mains for the immediate district?—I do.

2748. So that it would be necessary to have room supplied for more than the pipes, which merely supply the houses on each side?—Yes.

2749. *Chairman.*] How far do you go beyond Southwark-street?—Our company are confined to the end towards Blackfriars'-road, between there and Gravel-lane.

2750. Mr. *Toulmin Smith.*] Do you consider that the size of the subway now existing in Southwark-street will be sufficient to hold the pipes which will be necessary?—I think in a few years it will become insufficient; Southwark-street was made through a densely populated place, with very bad thoroughfares, and if that becomes a leading thoroughfare, of course it will be chosen as the best way of taking the pipes.

2751. Looking at a subway of such size as you think would be sufficient, you estimate the cost at 7 *l.* 10 *s.* a foot?—Yes, I did estimate it at that; I took it subsequently at, say, 5 *l.* a foot, merely for comparison.

2752. That would be 26,000 *l.* a mile, would it not?—Yes.

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2753. What would be the interest of that at four per cent.; 1,000 *l.*, would it not?—Yes.

2754. Have you considered another difficulty arising out of the subways; namely, the liability of leaden pipes to be stolen?—Yes.

2755. Do you consider that that is a liability to which the necessity of the case would very much expose you?—No doubt; we have found, at times, that they are stolen; the stealing of lead is now a serious annoyance in the Metropolis; we are ten times at the police office for that, for once that we are there for other things; it is easily cut and melted, and much more easily made away with than other things.

2756. Would you be put to a greater expense than you are at now for continual inspection in the subways?—Yes; we might probably overcome that difficulty; there is an objection to using iron pipes instead of lead, but I think we might overcome it.

2757. Mr. *Powell.*] Do you use much lead in your system?—Yes; but the leaden pipes do not belong to the company; they belong to the occupiers and owners of houses.

2758. Mr. *Toulmin Smith.*] Is it not difficult for the companies to know beforehand what is likely to come before them as a necessary work in the course of two or three years?—Yes.

2759. If you had it held out before you when you had your net-work of pipes carefully arranged, that you were, in the autumn, to have what they call a new street, dislocating the system, would not that very much interfere with any work you were proposing to do?—Yes; we should pause and consider it, and see whether we could not delay it with advantage.

2760. We have had some evidence as to gas pipes; that when they are taken up you cannot use them again very often, is that the case with water pipes?—A great many of them we should not be able to use again; but some portion no doubt we should.

2761. Can you give me any notion of what the proportion would be?—

The *Chairman* stated that the Committee did not wish for evidence with respect to old streets.

Mr. *Toulmin Smith.*] If a subway were to be made in Holborn, would the difficulty be so great as when you intersect, in the way shown upon the Plan, a number of old streets?

No.

2762-3. So that those old streets are infinitely less objectionable than what they call, by a misapplication of the term, a new street; inasmuch as the latter is an interference with the arrangements you have already made of the old pipes?—Yes.

2764. They run at right angles, and all sorts of angles, with your existing prearranged system?—Yes.

2765. Do you remember a few years ago when all the world was told that we should be healthy, wealthy, and wise, if we drained the towns with 4-inch pipes?—Yes.

2766. Were not we all abused for our ignorance if we did not jump at it?—Yes.

2767. It afterwards proved that we were in the right?—Yes.

2768. I believe Mr. Bazalgette published a book showing some pretty pictures of the condition of things that those people were reduced to who had taken up this new system?—I do not think Mr. Bazalgette went so far. I never put him amongst what I have been in the habit of calling the Chadwickian people.

2769. Mr. Bazalgette published a book showing the evil results, and not in favour of the plan?—Yes; he was quite aware what the evil results were.

2770. Having found that in that case, do not you think that results equally injurious will be produced by this new design?—Yes.

2771. After most careful considerations, can you conceive any advantage that would result to the companies from the use of these subways?—None whatever.

2772. We have been told of the convenience that the public would derive from the use of them?—I very much doubt that it would prevent the openings in the streets until we have had more experience. Give me a mile of it, laid under circumstances which would involve every contingency, and let that be put down some

some five or six years, and then I think we could be prepared to judge; but I do not think anything of those two examples.

2773. At any rate, if the convenience is for the public, the public should pay for it?—I think the public should pay for it. If it is to be forced upon the companies, I view it with very great apprehension, because I see that their property will be all swamped.

Cross-examined by Mr. *Phinn.*

2774. You have told us that you are a friend of rational progress; did you ever know anything new produced to which people did not conjure up a host of difficulties in your reforms?—There is no doubt that there are always persons who object to things which are new.

2775. You always do find a host of objections, a great many of which disappear, do you not?—No doubt.

2776. Your suggestion is, as I understand you, that before any legislation proceeds upon this subject, a mile of subways should be constructed, and experience gained?—Yes.

2777. Pray how are we to gain the experience if the companies will not come in?—That I am sure I do not know; that is your look out. I do not think it would be fair to ask the companies to come in, and involve themselves in all sorts of liabilities, and for you to stand by and look on.

2778. How is your experiment to be made if the companies will not come into the subways; how are we to make the experiment?—That is your look out.

2779. Does it happen to you—I know you are a man that likes to move with the times—to have inquired into the Nottingham practice at all; have you gone down and looked at it?—No, I never heard of it until I came into this room.

2780. We have heard that you have had some dealings with Paris?—Yes.

2781. Have you been and looked at the subway under the Boulevard de Sebastopol?—No, I have not been in Paris since that was made.

2782. Are you aware that a large water pipe is laid through there?—Yes, I have heard it.

2783. Of 30 inches?—I have heard so.

2784. Have you heard, at the same time, that any difficulties have arisen from the use of the subway?—No, I have not heard much about it; my friend, M. Corôt, died, and I have not heard much since.

2785. I suppose you knew some time ago that you were coming to give evidence here, A man of your eminence must have been consulted long ago by the companies, I think?—It is very curious. I have not been in very good health, and the companies did not consult me at all until I took the question up myself about three or four weeks ago; in fact, up to this moment I have never communicated with the companies; it is mere conversation; the whole communication has been with the solicitor; I have rather gone to him than he has come to me.

2786. Then I suppose you drew up your own proof very much?—No, I did not; I furnished the information.

2787. Did it strike you that it would have been desirable to have investigated the actual operation of those subways as regards water-pipes where they have been actually in operation?—I recommended them to send to Paris; they very much wished me to go myself, but the fact is, I was laid up 10 weeks in the winter, and I did not feel equal to going; I recommended them to send to Paris, and they did so.

2788. Perhaps you would like to go at Whitsuntide?—No, I think not; I have to go elsewhere, unfortunately.

2789. In what street was it; you said, I think, in Montmartre, where you found the sewer?—I forget the name of it; it is near Montmartre.

2790. Is it upon the hill?—Not quite upon the hill.

2791. Is it one of those main streets running out of the Boulevard where you see Montmartre in the distance rather dominating over the rest?—Yes, I think it is.

2792. You went there about 12 years ago and found an ordinary sewer, I suppose, not a subway in any sense?—It seemed to me, as far as I saw of it, to be a sewer; it was a sewer at the bottom, with a footpath at the side.

Mr. *Powell.*] We have not heard of this particular subway before, have we?

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Mr. *Phinn.*] Only from Mr. Simpson himself.

(*To the Witness.*) It was in a totally different direction to the Rue du Marche St. Honoré, we know?—Yes.

2793. Did you at all ascertain the length of the sewer?—No.

2794. Nor the dimensions?—No.

2795. You say you made great inquiries from your friend, M. Carôt; you did not ascertain the length to which the gas pipe was laid in it?—No; he spoke so confidently, and seemed so averse to the system of laying gas pipes in subways, or rather in galleries or *souterrains*, that I felt it would be very objectionable, and I set it down as not worth investigating.

2796. You formed a judgment upon that instance, I dare say?—On designing a new work for Paris, I thought the less novelties we introduced the better, and made up my mind only to introduce known things.

2797. Was it suggested to you, as part of the system for the introduction of water in Paris, to use the subways for the pipes?—No.

2798. Was your scheme ever carried out?—No, it was not.

2799. Do you know that the water from the fountain of Grenelle is brought through subways, in fact, through sewers, at this moment?—A portion of it, I believe, is.

2800. And a portion from the Seine?—I believe it is.

2801. Was it so when you were considering your designs for bringing the water into Paris for the New Water Company?—It was, to a small extent; I believe it has been extended since; so I have understood.

2802. Do you know what the dimensions of their mains are which bring the water of the fountains of Grenelle, or the well of Grenelle, rather; it is an artesian well, is not it?—I believe it is; I will look out the dimensions.

2803. If I suggested the right dimensions, should you recognise them, without giving you the trouble of looking for them; are they 12-inch pipes?—There are some larger than that.

2804. Are there some larger than that that are brought in this sewer?—I saw 18-inch pipes in Paris, and 15-inch pipes.

2805. Brought in this sewer?—That I am not aware of; I do not think there were any larger than 12 inches.

2806. *Chairman.*] Twelve-inch pipes were what you saw?—Yes.

2807. Mr. *Phinn.*] They were water pipes brought from the well of Grenelle and from the Seine, for the supply of Paris, through this sewer?—Yes.

2808. Viscount *Grey de Wilton.*] Where is the well of Grenelle?—It is in the south part of Paris.

2809. *Chairman.*] Within the Octroi of Paris?—Yes.

2810. Mr. *Richards.*] It is close to the Champ de Mars?—If it would be at all interesting to you, here is an account showing the respective size and condition of the water pipes in Paris (*producing the same*).

2811. Mr. *Phinn.*] What date is this?—Eleven years ago.

2812. "The Report of James Simpson, of the 11th of January 1853"?—Yes.

2813. Mr. *Powell.*] Was that report made at the time of the visit to which you refer?—Yes.

2814. *Chairman.*] What was the size of the sewer that you saw?—They were of various sizes. I have seen an engraving since which represented them very fairly; there was an engraving in the room.

2815. Viscount *Grey de Wilton.*] Were they sewers proper, or the mixture of sewer and subway, of which we have heard?—Sewer and subway.

2816. A similar subway and sewer to those we have heard mentioned?—They were called, when I was there, *les 'egouts souterrain.* They were, in fact, a sewer below a footpath, or sometimes two footpaths, with an archway over them.

2817. Mr. *Phinn.*] I see that you say, "The pipes which convey the water from the Puits de Grenelle to the Bassins de l'Estrapade, and the various branches, are all of small size, the largest not being more than five or six inches in diameter, and a considerable portion of them are of wrought iron, coated with bitumen"?—Yes.

2818. Those are brought, I think, in this *souterrain*, as we will call it; it is neither sewer nor subway, but a mixture of both?—Exactly; when I use the term 12 inches

inches in diameter, you know that that is approximate, because they are not given in inches, they are in portions of a metre?—Centimetres.

2819. Centimetres?—Yes.

2820. With reference to the canal de l'Ourcq, that supplies a great deal of Paris, does not it?—Yes, the largest supply of the worst water; the most abominable water I ever saw.

2821. *Chairman.*] That is the fault of the water, not of the pipe, is not it?—In fact, when I saw Paris, I had heard it compared with London; they said, how superior it was, but that is not by any means my experience; go into it by night or by day, I should say that London far surpasses it in cleanliness in the worst of streets.

2822. Mr. *Phinn.*] You have not been in Paris lately, have you?—No; I believe Napoleon has done a great deal. The last time I was in Paris I saw them polishing up the things in the streets; I was rather interested in what I did see there; there was room for improvement; take the allowing the people to go in every morning, swilling out all the cesspools, and running it through the best streets in Paris; the stench was beyond anything.

2823. They have got no metropolitan Board of Works there?—They have got a body there who are rather prompt in action.

2824. As to this canal de l'Ourcq, the pipes for it are brought through these *souterrains*?—They were not at that time.

2825. Have they been subsequently?—I have heard that they have; I do not know.

2826. Some of the water from the Seine, you know, is brought through these *souterrains*?—I have heard that it is.

2827. Can you imagine why the Frenchman has done that, except to avoid breaking up the streets?—I suppose that was his intention.

2828. I suppose the risk of frost in Paris is pretty nearly as great as in London, is it not?—I suppose it is, but then I have not heard that they have taken any small pipes through; I have no fear for our mains.

2829. Then your fear is for the service pipes, partly from frost, and partly from stealing?—Then we must have some explanations there. First of all, the leaden pipes belonging to the houses would be liable to be stolen, and particularly liable to freezing. The smaller the pipe, the greater its liability to freeze.

2830. Who is to steal the leaden pipes, because the subways will be under the control of an officer of the Metropolitan Board of Works; they will be kept shut, unless your men or your gas friends come in. Do you suggest that the workmen of the gas companies will steal your pipes?—I dare say they are about as likely to do it as our own men.

2831. Unless we have the telegraph people, there will be nobody but our men, your men, and the gas men; do you think the gas men will steal your pipes, or that your own men might steal them?—I say this: you may appoint as many men as you please. I will be bound that, for 5*s.*, I will get into those subways at any time.

2832. And steal the pipes?—I will do what I like. If you are so credulous as to believe that all the men who go into it are honest, I assure you, you are very much mistaken. As an old friend of mine, Sir Benjamin Stevens, of the Board of Works, who had had much experience of public buildings, once said, "Simpson, if your teeth were lead, they would have them out of your mouth."

2833. A counsel must be prejudiced in favour of his own side, as well as an engineer sometimes?—I can hardly suppose you were so credulous as to believe that thieves would not get in there.

2834. Would it not be possible to close the side entrances, and only give access when proper persons require to get access?—No; it would not be possible to close them. I will bring you a bricklayer, and I will answer for it, that he gets through that wall, though it may be a 14-inch wall. He will make a hole large enough for me to get through.

2835. And steal half-a-dozen pounds of lead?—And go away with as much as he could hide about him.

2836. You put that as a possible contingency in the case of these subways being used?—I think it is a very probable contingency; if you knew the trouble we had with these men; if they imagine they can get it away without being seen, they will be sure to take it; they go early in the morning, too, on purpose.

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2837. Do they dig up the streets to get at the lead pipes, occasionally?—Yes; no doubt they do.

2838. You would be no worse off in the subway than you are at present then, at any rate?—Only that the pipes are more accessible.

2839. They would have to break from the cellar of the house, through the brick wall, into the passage, and now they have to dig up the street; of course, there are policemen walking about, but they are never to be found when wanted?—Many years ago, the ancient conduits of London were supplied through a subway, which I remember seeing from the vaults of a house in Oxford-street. A year or two previous it had been discovered that a man had rented the house, and had used it for various purposes; and, after the conduit had ceased to be there, he managed to extract the leaden pipe to a very considerable extent.

2840. He had a kleptomania for lead?—He seemed to have taken a great quantity away, but it is notorious that lead is stolen. I remember once making some alterations in Hyde Park, and, crossing the lower wall into Kensington Gardens, there was a five-inch leaden pipe laid underneath, which, I should think, must have been 120 feet long, and, in all probability, four tons in weight; it was a very thick old pipe, and some thieves managed to get it away in a night; they did all the ground work, and cut through the wall, and everything, and got it away.

2841. Mr. *Powell.*] That was some of your own workpeople, I suppose?—We never knew who it was; I thought, from a question put to one of the gatekeepers, that it was a concert between them and our own men.

2842. Mr. *Phinn.*] You have not been down the Covent Garden subway, I presume?—No; but there is nothing peculiar in it.

2843. Are you aware that we have had leaden pipes down there for two years?—No.

2844. Have you heard how many cwts. of lead have been stolen from the Covent Garden subway?—I have never heard that any has been stolen; but I think in putting forward a scheme like this, we ought to have all sides of the question settled, and that we must not be forced into that subway with everything to devise ourselves. I think that your party must undertake a fair responsibility and a fair amount of the engineering part of it.

2845. And if we do so, that will remove a great many of your objections, I suppose?—If you render it practicable; but I do not see how you can do so at present.

2846. You are a cautious reformer; you want to see your way?—I do want to see my way about it; but I should not like to be connected with it and find it fail, and to hear persons say, a few years hence, "You were a party in spending all that money, and it is useless."

2847. Nobody can say that of you after your evidence about the subways; you will not have that reproach?—They may not say so now, but they will talk of it hereafter. I am accustomed to enter heart and soul into a thing if I do take it up, and get all my friends into it.

2848. With regard to frost, which is another of your apprehensions, do you think there will be more chance of freezing in the service pipes radiating from these mains than there is at present?—I think there would be more chance in the waterworks service pipes.

2849. Have you at all inquired whether that is the case in Paris, or not?—No.

2850. You have mentioned a subway of which you have some knowledge; did not you say that you carried a subway under Piccadilly?—Yes.

2851. Where does that go to?—It goes under what is now the Marble Arch.

2852. What is its length?—Its length is 200 yards.

2853. Will you tell me its dimensions?—I think it is about three feet wide and four feet six high; it was made in the form of the Westminster sewers, but it is laid at a great depth.

2854. At what depth under the ground is it laid?—I think, as much as 20 feet.

2855. Does it only carry water?—I think it carries two three-inch pipes, which convey spring-water from Hyde Park to Buckingham Palace, and Saint James's Palace.

2856. Is it as low as 20 feet below the surface?—Yes, I think so.

2857. Is

2857. Is it arched with bricks?—Yes.

2858. When was the pipe first laid; you say the subway was constructed 20 years ago?—It was laid at the same time; when I say 20 years ago, I think I am wrong; it must be 30 years ago.

2859. How has the pipe got on?—I never heard of anything being the matter with it.

2860. Can any gas get to it?—No; I do not think there would be any gas likely to go to it; it is embedded in solid clay, and puddled over.

2861. So that an escape of gas above it would not affect it?—I think not.

2862. Is the subway ventilated?—No.

2863. You cannot stand upright in it, I suppose?—No; but I have been through it.

2864. You have been through it on your hands and knees, I presume?—Not quite; I crawled through it.

2865. That is the subway where you paid 25 per cent. extra for the work, is it not?—Yes.

2866. With regard to your own mains, you gave us a very pretty diagram, which, I think, is lying before the Noble Lord?—It is Mr. Toulmin Smith's diagram, but I adopt it.

2867. It represents, as I understand, the old district with the new streets drawn through it?—Yes.

2868. That exactly represents what Southwark is now, does not it?—Yes.

2869. Will all those pipes, with our existing subway, lie under it or over it?—From what Mr. Hemans said, I think they will lie over it; I saw them carrying one pipe over it.

2870. That represents the intersection; we will assume a street with a subway and with some dozen pipes; have you heard of any difficulty occurring in Southwark by that intersection?—I do not know, but I would never do it; they wrote us a letter about it to Lambeth, and I said it would be time enough to consider that, and that we had better not interfere about it; our inspector cut the pipes on each side, and there left them.

2871. We are told that that is a representation of it?—That would be through the bulk of their district, not ours.

2872. You adopted this as a representation of a street running through a mass of pipes?—Part of the street would not be unlike that.

2873. Have you heard of any difficulty during the construction of our subway, or since the construction, with regard to running through that mass of pipes?—I heard a man complaining at the time that there would be a good deal of crooked work; but I did not pay much attention to it.

2874. Of course, where you have these right angles, and where there is a sudden resistance, there would be a difficulty in working your water, I suppose?—Yes.

2875. And very often you have to carry the water at varied levels?—Yes.

2876. You have to make angles in the pipes at different levels?—Yes.

2877. That indicates a certain amount of resistance, does it not?—Yes, when you say a "certain amount," in some cases it is a very serious amount.

2878. Your pipes are all constructed, in the first instance, to resist any pressure of that kind?—Yes.

2879. What is the maximum power at which your pipes are tested?—Three hundred feet.

2880. Three hundred feet to a square inch?—A column of water 300 feet high.

2881. Pressing on what; on the whole surface of the pipe?—Yes.

2882. With regard to gas pipes; they are tested to resist a column of four to six inches of water, are they not?—More than that.

2883. But that is about it?—That is their working pressure.

2884. They are tested above their working pressure; but this would represent it?—I never saw gas pipes tested as low as that. I have generally had them at 50 feet; and in the case of Copenhagen, where I had the direction of the gas-works, they were all proved at 100 feet.

2885. But the ordinary pressure is four to six inches?—I have known them worked much higher.

2886. I know one company that work at 50 inches; very few companies work at four; it is an unusual thing. Mr. Innes told us from four to six inches, and he thought it was too high; he thought that four would be sufficient?—They

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do work under four inches, but the proof is only of very short time, and I do not attach much importance to it. We very often find pipes give way under very much less pressure than the proof, and from this fact: you may apply hydraulic proof, and it is like bending a piece of wire. There is one of our writers on engineering who has said, that a permanent set is a partial fracture. You take a bit of wire that has a fracture; you take it again, and give it some half-dozen twists, and it is not broken; and so the same effect is produced by the introduction of hydraulic pressure. There were some Blue Books published formerly, from which it was very evident that hydraulic pressure, as a test, might be carried so far as to injure the pipes.

2887. You have said that there are two causes of leakage from the gas pipe which affect your water; the leakage at the joint, which we all admit, and the porosity of the pipe?—Yes.

2888. Is not that reduced to a minimum by care?—Yes; but that minimum I have never found very low. I have now a case on my own hands, and a very good example it is, because I have paid great attention to it. There are about a mile of pipes already employed in the Chelsea Company's old works at Pimlico; the fittings were all put in by a very good gasfitter, and a man I have some confidence in; and I was in the habit of having a register taken when the lights were put out in the morning, and the number of lights burnt were also registered. We took the leakage of the day, and I found on that mile that the leakage was going on at about 14 feet per hour. Now the pipes began at two and a half and three inches, and so they went over the premises. I was convinced that there was something wrong, and I tried all the fittings, and persevered for nearly three months, and I brought the leakage down to about two and a half feet an hour. I doubt whether you could have done that in a street. That led me to find a great many defects, and particularly sand porocity pipes. Applying my other experience from hydraulic pressure, I have observed pipes sometimes become damp, I have put my face against them and felt a sensation of coldness, not exactly spurts of water; but I have obtained a highly polished looking-glass, and it has shown the spurts of water and the collection of dew on it.

2889. Was that when the pipes were cast horizontally?—No, vertically; and by one of the best makers.

2890. Is it not the fact, now, that in all contracts it was a condition that pipes should be vertically cast?—In the majority of contracts it is so. The great difficulty you have is to get a founder to do it.

2891. I suppose you can tell whether a pipe has been cast vertically or horizontally?—No, I cannot.

2892. I thought such an experienced man as you could probably tell that?—I could tell it generally, but they are so clever in casting now, and so beautifully do they do it, that you cannot see it.

2893. You think it would be worth the while of large contractors to deceive you?—If you had to deal with the number of people I have, in the question of pipes, you would find that out. I have cut a pipe and found it seven-eighths thick on one side, and the thickness of half a crown on the other. You argue with the agent of the parties who take the contract, and he tells you that it is merchantable, and every argument may be used to induce you to take the pipe.

2894. Is it not a common thing, when a man is under contract, to keep an inspector on behalf of the companies with whom he is contracting on the premises to see the castings?—A very common thing indeed, and one of the most deceptive things possible; the idea of sending a man down to the works, in all probability to superintend a contract which may amount to 30,000*l.* or 40,000*l.*, and giving him three guineas a week, is absurd.

2895. Something like the Government sending a man down to inspect the gunboats, and then to find that they have short boats; you cannot expect everything?—If I were to tell you all the secrets of the iron trade which I have found out in my time, you would be rather surprised; but there are a great many I have not found out yet. If you imagine that inspection would ensure you good pipes, you are very much mistaken.

2896. It comes to this, that you find that the leakage from your gas mains and service pipes is a serious inconvenience to you at present?—Not at present.

2897. How long has it been remedied?—It has been improving very much since

since the districting system began, and altogether I must say I have a great opinion that the gas companies have become tolerable neighbours; hitherto, they have been sometimes very troublesome indeed, but I live in hopes to see the day when we shall trade amicably together.

2898. You were consulted with reference to the clauses introduced into the Gas Metropolis Act, with reference to a minimum contiguity between the pipes?—I do not remember that I was.

2899. It begins at the 48th section: "For the protection of water companies." But the artificial provisions begin with the 50th section, about "the mode of laying pipes." There is to be a distance of four feet, if possible, from any water pipe; is that observed in practice?—It is observed as far as they can; it is not a new clause, it is an old clause.

2900. It was not general; it was introduced into special Acts?—Yes.

2901. But was afterwards made a general practice?—Yes. Formerly the Lord Chancellor was in the habit of giving certain clauses, and when a man came from a company and complained, he would have clauses drawn. We had no model bills at that time; that is the way the original gas clauses got in.

2902. They are to "use such joints as are, for the time being, of the most improved description for preventing the leakage of gas, and shall in no case join two or more gas pipes together, previous to their being laid in the trench, but shall lay each pipe, as near as may be, in its place in the trench." Do you find the workmen observe that?—No, they do not observe it; the fact is, that the whole of this large Metropolis would stand still if you were to observe every minutiæ of an Act of Parliament.

2903. I suppose you observe as much as is convenient?—I assure you sometimes I am glad to look on and push on things, and forget the Acts of Parliament altogether.

2904. What they call, in the election committees, burning the Corrupt Practices Act before they begin?—Yes, it is very easy to draw a clause, but it is extremely hard to carry it out; I have drawn a few, and I dare say made a mess of it.

2905. Supposing we have subways, the length of them would prevent the men jointing the pipes before they are lowered; you will admit that that would be a little compliance with the Act?—Yes.

2906. We should get something good in the subways at any rate; you will admit that little item of good?—Yes; but that really is an exception; I mean the laying two and two is the exception; you cannot do it with large pipes; it is out of the question.

2907. What do you say the leakage of the gas is at present, because I suppose you must have a good deal of practical experience, though you are a water engineer?—It varies in different places.

2908. I see that 20 years ago you discussed this matter at the Institute of Civil Engineers, of which you are a member?—Yes.

2909. Did you say that you felt convinced that 25 per cent. of gas was lost from the leakage of the pipes and the joints, and in opening the streets; the difference between the gas and the water pipes was immediately perceived by the soil around, the former being saturated with gas?—Yes.

2910. Is it 25 per cent. still?—There have been improvements made since that. I directed attention to it, and everybody have been doing their best to correct the mischief.

2911. Your attention having been called to it at 25 per cent. 20 years ago, what should you say it is reduced to now?—I have had no recent opportunities of trying it very particularly. I happen to have an interest in the Kingston works, and I question, at present, whether it is more than 10 per cent.

2912. I see it goes on to say, "Mr. Simpson quoted an instance where, in a length of 1,000 yards of iron pipes two inches in diameter, there had been a loss of 357 cubic feet of gas in 24 hours. By perseverance in repairing the escapes, the porous spots and other defects in the metal of the pipes, the leakage had been reduced in three years to about 13 cubic feet in 24 hours"?—Yes.

2913. Is it not a great thing to have continual access to pipes when you suspect an escape; that I suppose you will not question?—There may be some disadvantage; I can readily conceive at present that the inspection would be very good indeed, and then it may be attended with some other disadvantages,

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which I do not see. In fact, I tell you candidly, that until I eat my bread and cheese in the subway for many many months, I shall not be satisfied.

2914. I want to get you on by degrees. You recognise a great leakage, and you recognise the facility of that going on without detection as long as the pipe is underground?—No, because we very often find it out.

2915. We found out one in Pall Mall, which I do not think the gas company knew of; they were surprised at it; did you see a sample of the earth which was brought here?—No, I did not.

2916. Nor smell it?—No.

2917. Do not you think that it would be a great thing for the water companies to be able to go and say to the gas companies, "Here is your gas escaping, and you must prevent it"?—We do so now.

2918. That is when you happen to open the earth?—When we happen? No; we open specially.

2919. Supposing a customer complains to you that his water is tainted with gas, what then?—There is generally an unusual smell in the street, or the area of the house; it is our men's duty to report that.

2920. Take the case of a customer complaining that the water is tainted with gas, what means have you to find the point at which the gas escapes, except by opening a long line of pipe?—We give notice to them; and if they do not send men to open it, we do it.

2921. But you may open the whole length of the street before you find the spot where leakage takes place?—You may open many yards, no doubt.

2922. With regard to ventilation, that is a matter that the Committee will decide for themselves; because they have seen these two subways; you have not been down them since they have been completed, have you?—No.

2923. Would there be any difficulty in putting a fan there to increase the ventilation, if it is not sufficient already?—No; but there would be a great objection to any mechanical contrivance of that kind, because it would never be worked. If any one proposed to me to institute a system of subways, to be worked by fans, I should say that I did not think he was in his senses.

2924. Do you think that we could make the flow of water under the sewers work the fan, if we could not get the men to do it?—The idea of working water wheels by the sewage, and obstructing the sewage, is really nonsense; I very much doubt whether Mr. Bazalgette would suggest that.

2925. Now, with regard to the flooding of these subways, the mains are immediately above the sewer?—You want openings into them.

2926. You want openings into the sewer; what objection would there be to construct proper gratings?—I do not know of any.

2927. The water would go down directly into the sewer?—That is a part of your plan; I want to commit you to everything, and then I will be committed myself; but if you bring a bear thing, and ask me whether I will accept of it, with all its troubles and liabilities, I say I will not. I think that a scheme like this ought to come here perfect, and even in the construction, so far as I have seen, there is a great deal to be done to make it practicable. You may pass an Act of Parliament, and a difficulty may turn out two or three years afterwards that you do not see just now, and I do expect that a difficulty will arise.

2928. We had a difficulty a few years ago about the construction of railways; we were told a few years ago that we could never go more than six miles an hour on a railway?—I know better than that; I was no party to telling you that.

2929. You say that your water mains require very little repair, and you have given us the number of openings which you have made?—Yes.

2930. That does not contain the number of openings you have made for laying new mains?—No.

2931. That is a much longer operation, the laying of new mains and connecting them?—Yes.

2932. What length of street has been broken up in the course of the last few years for the laying of new mains?—That is, in dedicated streets, you mean; in open streets.

2933. Yes; where there are actual houses on both sides?—I should think about three to four miles in Lambeth, and two miles in Chelsea.

2934. Each year?—Yes, each year.

2935. I will take any street you like; take such a street as Albemarle-street.

Supposing

Supposing you wanted to lay a new main in Albemarle-street, how long would it take?—I do not know the length of Albemarle-street.

2936. Is it 400 yards?—I should think the men idle if they did not get over 150 yards a day in a street like that. It would depend upon the size of the pipes.

2937. You mean digging down, laying the concrete, ramming, and connecting?—We do not do that.

2938. Who does the ramming?—The vestry.

2939. The street has to be opened, then the foundation of the pipe made, then the pipe laid and connected, and then the earth closed and made perfect for the traffic again?—It rests with the surveyor how long he takes to do it.

2940. Can you lay 150 yards a day in London?—That is a very common thing for our men in the Chelsea district to do when they get special orders.

2941. But, under ordinary circumstances, how much would they lay?—Under ordinary circumstances they would do from 50 to 100 yards.

2942. Have you not had a good many grievances represented to you by shopkeepers for the obstruction of the access to their shops, and loss of trade?—No.

2943. Never?—No. I have had applications made to me to request that I would order plank bridges over the thoroughfares in the case of very large pipes.

2944. Perhaps the shopkeepers on that side of the river have not so many carriage customers as we have on this side?—We have very good shops.

2945. But not the same class of people as we have on this side of the river. Have you not had complaints of loss of custom from people not getting access to their shops?—Yes, it is a serious objection. But if you think you are going to prevent it by subways, my opinion is that you will be mistaken. I have a case now, which has already been before the Chelsea Board, where we shall be obliged to duplicate the mains that have been down only 12 years.

2946. Assuming one company in the district for water, and one for gas, how many pipes would that subway in Southwark take in; take the maximum dimensions?—Perhaps you will tell me under what circumstances you are going to lay them.

2947. You shall have the laying of them?—I want to know how they will be done. We want to know the position. Suppose I was the engineer to the subway, I should set out a gangway over the sewer, to be clear of the pipes. I think you say that subway is 12 feet wide. Then we are to take three or four feet six for the gangway.

2948. Three feet for the gangway?—I will take a three feet six gangway, that will leave me eight feet six.

2949. Take Southwark-street, because we have a gangway there?—Then I must take the information conveyed by Mr. Innes yesterday. He proposed to lay an 18-inch pipe, and by the time he had got an 18-inch pipe, and a 12-inch pipe for the service, one side of the sewer would be occupied.

2950. They would be on the ground?—Yes; on the ground.

2951. Did you hear Mr. Innes say that, in Paris, some of the water pipes were suspended on brackets?—Yes.

2952. And that they do not suffer from vibration?—I think that would be an objectionable way of laying them. I believe, from considering what you are likely to have in water and gas pipes, that that is a fair model of Southwark-street.

2953. How do you mean a fair model?—A mere small-sized thing.

2954. Not a thing that would, practically, carry the pipes through the streets?—I believe this day 10 years you must either increase that, or make another.

2955. I am talking of the present requirements?—You do not know what the present requirements are.

2956. We will assume the preamble of the Bill passed. We will assume the houses built on each side of the street, and the engineer of the Board of Works coming to you, and saying "Mr. Simpson, what water pipes do you want for this street"?—Then I should say, "It is not large enough."

2957. Take the case of Southwark-street?—If you confine it to Southwark-street, of course that is a different thing. But do you suppose that a leading thoroughfare like that would not be made use of of necessity for conveying pipes.

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2958. What quantity of pipes would you put down in Southwark-street, assuming the houses to be built on each side of the street?—For the purposes of the gas there would be one 18-inch and two tens, and for the purposes of water one 18 and two sixes.

2959. Do you want an 18-inch pipe for water?—Yes; because that would be a leading main. I have no doubt the Southwark Company would be glad to get that main, because they have very large supplies in that district; they have a brewery that takes a 12-inch main alone.

2960. You would not lay that main for that brewery through Southwark-street, would you?—The main crosses it, and we should go part of the way out of High-street, and then join it. I have no doubt if they wanted a more direct main they would do it.

2961. The main is laid for the brewery at present?—Yes.

2962. That does not in its course run over any part of the present Southwark-street, does it?—It must cross it.

2963. Is that the main which is carried over the top of the subway now?—Yes, it must cross it; there can be no question about that.

2964. That main at present crosses the subway?—Yes.

2965. You would not alter the position of it, would you?—No; but if I wanted to get any better supply I would go out of High-street into Southwark-street; it would be an advantage to extend it along there.

2966. But it is not a necessity?—We always find leading thoroughfares to be the best way to take the pipes.

2967. What would be necessary for the service of this street when the houses are constructed?—Do you mean the street *per se*?

2968. Yes?—I do not know what the size of the houses is.

2969. They are about 300*l.* a year rental?—I could not tell you off-hand.

2970. Would a 12-inch main do?—I dare say it would.

2971. Would a 14-inch main do; that is giving you two inches more?—I have no doubt the supply would be large there, because they are required to give a high-service supply, and you cannot do that with small pipes.

2972. You mean a service of high pressure?—Yes; I think that it is a great mistake to make that subway so small.

2973. You saw the construction of that subway?—Yes.

2974. You were there whilst they were constructing it?—Yes.

2975. Did you ever complain to the engineers that it was too small?—I had nothing to do with it; I should not have presumed to say anything to them about it.

2976. You did not suggest to your brother engineers that it was too small?—As a professional man, I should not have done such a thing.

2977. You told me that there were hundreds of instances of servants being injured in cellars by explosion of gas?—I have occasionally heard of it for the last 25 years.

2978. That is under the present state of things?—Yes.

2979. From the saturation of the earth, and the gas escaping into the cellars, has that been so in hundreds of cases?—I do not know that it was actually from the saturation of the earth. In the case of Parliament-street, a great deal of it was from an actual fracture of the pipe from the sinking of the earth over the sewer; it tore away the pipes, and the passage of the gas must have been direct from the pipes into the vaults.

2980. Were not you rather romancing when you talked of hundreds of instances?—No; it is a very common thing; I think if you gave me time I could bring you 20 or 30 girls now who would tell you that they have had their hair burnt off, and that they have been burnt in the neck.

2981. That they have been burnt in the cellars?—Yes, in going to get coals.

2982. Wine merchants have their cellars under the streets of the Metropolis; do you find that the wine merchants are blown up too?—This is the peculiarity of the case; you have got an area, and you have got the vaults or cellars as you call them, and the girls go down to get coal in the evening, and an explosion takes place.

2983. But where does the gas come from to make the explosion; does it saturate through the earth?—In some cases it does; but in the case of Parliament-street a great deal of it was from the sinking of the soil, fracturing all the pipes.

2984. How long had the soil sunk?—It had been a long time about.

2985. I suppose

2985. I suppose the gas had been escaping some time for such a quantity to collect?—It occurred from day to day and week to week for many months.

2986. Do you mean that girls were continually blown up?—The girls were not continually blown up, but the leakage had been going on for a long time; I suppose the girls got wise; one told the other, and they were more cautious.

2987. I am told that is the section of our subway, with your proposition as to the pipes in it (*handing a Section to the Witness*)?—It is not my proposition, because I say three feet six in the centre.

2988. We have given you three feet?—Then you have not taken the sockets; you have not allowed the 18 inches, and you have forgotten the thickness of the metal.

2989. Is not there plenty of room to allow for the sockets and the thickness of the metal?—To put such a thing forward to a practical man is a farce.

2990. You say we do not allow for the sockets and the thickness of the metal; take the sockets of an 18-inch pipe; what will that add to it?—I have made a diagram of what it would be in a few years time, when further pipes would have to be put in there, and you would find, I think, that they would fill the subway up entirely. I find that it could be filled up with very little ease; the sockets are shown in my diagram, and the thickness of the metal too.

2991. I see you have got a 12-inch, an 18-inch, and two 5-inch pipes in this diagram of yours?—Yes.

2992. These are all on the same level?—Yes.

2993. Do not you think a little might be done by varying the level; you might lift up one a little, and keep the other still on the floor; that might be done by a chair, or something of that kind, might it not?—There would be no more room than you have got now, because they go underneath, and one pipe there is under the other

2994. They are all on the same level surely?—A vertical line drawn there would come over that pipe (*explaining the Diagram to the learned Counsel*).

2995. In this diagram of yours there is all the space above occupied?—Yes.

2996. Mr. *Powell.*] Is that a three foot gangway?—My notion was, that we ought not to interfere with the opening of the sewer, and that anything that we should do ought not to interfere with the archway.

2997. What would an 18-inch pipe be from side to side?—Twenty inches in the middle, and, with the sockets, 24.

2998. Mr. *Phinn.*] Do you intend that the socket of one pipe shall meet the socket of the other?—Not always; if we were to lay them on chairs, we should bring the chairs to act upon it.

2999. Are you aware how the gas pipes are laid in the Kensington Museum; do you happen to have gone there?—I have not been there for some months.

3000. Have you seen the pipes laying along parallel to one another, with the sockets at different spots, and not all meeting?—It is a common thing to lay them both ways; but if we do them in this case, it would be a question of how we could get the chairs best put in; if we are to be confined to so little room, I would not give much for the subway.

3001. You have put the best possible case for yourself in your diagram?—I do not know that I have put the best possible case. I have put the case where I saw it would be filled up.

3002. That is putting all the sockets together, and putting all the pipes at the same levels. Do you observe that, on each side of the sewer, there is a space where you might depress some of the pipes?—I would not have pipes laid over the opening of a sewer.

3003. I do not say over the opening; but on each side of the section of the sewer there would be a sort of trench unoccupied, filled up with earth?—They would not lie over there.

3004. Why not?—In your working drawing there are a number of openings shown, and I think I saw one or two of those openings made. As a practical man, I would not lay pipes on the walls of a sewer; I would have them clear. I would not lay one pipe over the other; it is impracticable: when I say impracticable, you can do it, but I would not advise it.

3005. Do you never move one pipe over another now?—We are not in the habit of laying them that way; we keep them as clear as we can.

3006. Is it not a common thing to do so now?—I should say that it is decidedly objectionable.

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3007. You spoke of a sewer sinking in Chelsea?—Yes.

3008. Was not it in the Green Park that you found the contractor had not done his work properly, and you made him remedy it; you brought an action against him, did not you?—I think not.

3009. You have spoken of King's-road; was it not the case that, directly the work was completed, or soon after, the bad work was detected?—The sewer I allude to is the one which was made at the time Chelsea Church was built.

3010. How many years ago is that?—It is a good many years ago.

3011. Can you tell us an instance of any sewer constructed by the Metropolitan Board of Works in recent days having caused any disruption of your pipes by subsidence?—We have frequently had to dig down, after they have left the works, to raise our pipes, and set up the joints; and in some cases we have had pipes broken from the subsidence.

3012. Tell me any case that has occurred?—They are so frequent that I cannot remember them off-hand. I dare say I could give you a list of them, if it were necessary.

3013. It is not the subsidence of the sewer itself; it is the subsidence of the ground above the sewer?—Yes.

3014. Is it not the subsidence of the sewer itself; the foundations of the sewer are right enough?—I should say, from what I know of the ground of the Chelsea district, that one half of the sewers settle generally.

3015. Are those sewers that have been recently constructed?—I do not know that they have been recently constructed.

3016. You mean those that were constructed 20 or 30 years ago?—Less than that.

3017. Have any of our works for the main drainage subsided?—I do not know, because I have not seen them.

3018. You have had a good deal to do with re-arranging your pipes in consequence of the main drainage, I suppose?—In some cases we have.

3019. You have had to carry them over the sewer that has been made, but never under, I suppose; sometimes the land, with all the care in the world, may subside?—Yes, considerably.

3020. You cannot expect to prevent that?—No.

3021. Would you think it bad work if any subsidence took place in the brick structure?—With some soil I should not think it was bad work.

3022. Do you know of any recent instance of subsidence that you can give us?—You see we do not find these things out until a long time after the contractors have made their works.

Re-examined by Mr. *Toulmin Smith*.

3023. My learned friend has been anxious to show what you could get into the subways; chairs have been spoken of; if the pipes were laid in chairs, would it not tend still further to fill up the subway?—Chairs might be arranged so that they would cause very little interruption.

3024. How would it be possible, if the pipes were arranged in the way sketched here, to get at the small pipes that are nearest the wall; to repair them, would you go a-straddle the big pipes?—It would be a difficult thing to arrange them at all.

3025. You have not allowed anything for working space there, in your sketch?—No; I wanted to see what would fill the subway up, and that does not appear to me to be a very extraordinary state of things. In a few years time they would find it filled up, because we can hardly set a limit to the increase, more especially with reference to the transferring of gas and water pipes from one district to another. You may say we may limit the number, but you cannot limit them. Take our Chelsea district; we have five gas companies all coming through that district with leading mains. How are they to get to the City and over the denser part of the metropolis about Charing Cross? Why of course by going through Charing Cross; they can get no other way. I should like to know how they would make a subway there; there are more than 30 lines of pipes at Charing Cross.

3026. Do you adhere to the statement you made in your examination in chief, that it is necessary to have a clear foot round each pipe between the sockets, in order to get sufficient access for repair and jointing?—Yes, and for cutting out the

the pipes and renewing them. You must remember that the Metropolitan Board of Works are going to do this work for all time, and there is to be a prohibition that you are not to open the surface any more.

3027. My learned friend quoted an Act of Parliament, by which the gas companies are required to lay their pipes at a distance of four feet from the nearest point of any water pipe. Supposing the Act of Parliament were complied with in the subways, how many pipes would you get in?—We could not put any at all; and if we had laid gas pipes I think it would be a very serious thing; there would want special legislation to meet that case. If the water companies get into the subways, before the gas companies, they may say, "You shall not lay your pipes." I can readily imagine that such a thing would become a matter of contest.

3028. If the pipes are put as close as in this diagram, would there not be a difficulty in applying service pipes to them?—Yes.

3029. All those things must be considered as some of the things which must be remedied before they are in working order?—Mr. Bazalgette had a new mode of laying the service pipes across; I think that is a temporary measure. We want something different to that; we want them not to be liable to be knocked to pieces by the carts passing, or the trucks passing, down the tramway. In fact we want the whole thing rendered practicable, and if they cannot show us how to do it, we must try it ourselves, if it is to be done.

3030. In another point of view it was suggested that the upper part of the space might be used for the pipes; would it not be difficult to arrange for any pipes above the other pipes?—It would be very difficult. I think the suggestion involves going to inconvenience, by doing the work for the sake of confining the size of the subway and going to a large expense; because when you leave brickwork, and go to iron for frames or brackets, or anything else, you will find it very expensive.

3031. But would not putting one pipe above another stop any access to the side passages, which are three feet high?—Yes.

3032. And it would be absolutely impossible to use the subway as proposed, if you have one tier of pipe above another?—Yes; iron would be 20 times more expensive than brickwork.

3033. For the chair, you mean?—In any way I can readily conceive that you can make a subway large enough, throwing in the expense of the iron. That would make a good thing of it, and not have any of these expedients and after thoughts; doing the work properly, in fact, at once.

3034. You were asked some questions about Paris, and I think we heard that the largest water main that goes through the subways, does not exceed 12 inches. That would not do for main pipes in London, I think?—No; we have mains larger than that. We have very long lengths in the Chelsea and Lambeth districts, 18 inches in diameter; but since I was in Paris, I believe they have got some as large as 18 inches.

3035. But your common mains are larger than that, in both Chelsea and Lambeth?—Yes.

3036. In the Paris subways, there are no side passages at all?—There are entrances.

3037. But no side passages?—No.

3038. Is there not another way in which the Paris arrangements differ from those proposed here, that if the pipe bursts, the water would have a chance of getting away?—It would be relieved directly.

3039. It was suggested that there should be openings into the sewer below. Are there any traps so perfect in a confined atmosphere like that from which the gases from the sewers would not ascend?—All those traps must be maintained by a continued supply of water.

3040. You would want another pipe which would fill up the surface?—You must either tap the water pipe or carry the water in some way to keep the traps supplied with fresh water.

3041. It was attempted to prejudice what was shown on this sketch, by showing what was actually done at Southwark-street; did you hear Mr. Innes give his evidence?—Yes.

3042. Did you not hear the difficulty they had in Southwark-street to carry the pipes across, and that there was a contrivance with iron plates to accomplish it?—Yes.

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3043. At present, in Southwark, all is in a state of confusion; the arrangements are not really completed, and therefore that does not test the case at all, does it?—No, I think not.

3044. It has not been worked out yet to show what the results will be. When they have completed their arrangements, you will be able to see?—Yes.

3045. And everything must depend upon the conditions of that case?—Yes. I must say you will have to make several subways, and you will keep improving on this one before you can get that which is really a practical thing, and it is questionable then whether it would be worth while to use them; I see so many objections

3046. There is one other point, namely, as to the porosity of the iron pipes; you were asked some questions as to that being reduced to the minimum; the minimum does not mean an absence of loss, but it means the lowest quantity of loss?—Yes.

3047. And when that minimum is reached, there is still a considerable loss that way?—Yes.

3048. Which, if occurring inside the subway, would cause a continual insensible perspiration of gas through the iron pipes?—Yes; and it would more particularly occur when the greater pressure is on. An instance occurred in conveying water to a silk manufactory, where a communication had been made with the sewer, and the effect of that was, that when the larger supply of gas came from a greater pressure, the side of the boiler was blown out.

3049. That was an experimental case?—Yes; the explosion blew out the side of the boiler, and, of course the escape of gas there must have been very large. In fact, whenever I have gone down in the sewers, I can smell it, and, more especially, at all the openings.

3050. Those are actual illustrations of what these gentlemen are providing for us in the subways?—They are presuming a perfection of work which they have scarcely obtained yet.

3051. *Chairman.*] Do you supply Southwark-street from Lambeth?—No.

3052. Do you belong to Chelsea or Lambeth?—Both.

3053. Who is to supply Southwark-street?—We have not decided about laying pipes in the subway; I have had no order about it, very likely both the companies will have pipes there; we supply the end next the Blackfriars-road; we supply the houses there in common with the Southwark Company.

3054. Do either of the companies go across High-street at present?—Yes; the Southwark and Vauxhall Company.

3055. How do they get their water there now?—It goes up High-street; but there is an engineer now in the room, who can give you better information upon that point than I can.

3056. How does it get to High-street from the west?—It comes from the Elephant and Castle.

3057. Do you supply Union-street now?—No; we have no pipes in Union-street proper.

3058. Who supplies Union-street?—The Southwark and Vauxhall Company.

3059. Have they a right to supply Southwark-street, if they choose, or are they limited?—They can supply it if they choose.

3060. Viscount *Grey de Wilton.*] Have you your district all to yourselves?—No.

3061. Not on either side of the water?—Yes, on one side we have.

3062. But not on the Southwark side?—There is some intermixture of the pipes on the other side from former competition.

3063. *Chairman.*] Chelsea and Lambeth do not go beyond the High-street, I understand, east?—We do not approach High-street; we do not go beyond Gravel-lane.

3064. Who supplies the brewery?—The Vauxhall Company.

3065. The Vauxhall Company will supply Southwark-street, I suppose?—Yes; there is a part of Southwark-street which comes into the Blackfriars-road: between Gravel-lane and Blackfriars-road.

3066. How far?—I forget; I should think 200 yards.

3067. Will there be any houses built on that spot, do you suppose?—I think not.

3068. That is owing to the railway, I suppose?—The railway will occupy a great deal of it.

3069. There

3069. There will not be much water wanted for that part of the district, I suppose?—No, except to get from Blackfriars Road into the back streets.

3070. You can cross the railway from the back streets, cannot you?—No; the railway is too high up in level.

3071. But you can go under the arches?—I do not think the company would let us go; we go down Holland-street at present, which is the street nearest the river.

3072. Is there any reason why you should not continue going down Holland-street, if the subway was too small?—No.

3073. Have you any idea of the quantity of water that will be required in Southwark-street?—I think it will be large.

3074. Have you any idea of the quantity, the number, and the size of the house frontages?—No; the principal part being out of our district, I have paid very little attention to it.

3075. It is the Vauxhall Company who will probably supply Southwark-street?—I think nine-tenths of Southwark-street will probably be supplied by them.

3076. The gas company ends, does it not, in High-street?—I do not know.

3077. If they do end in High-street, would it be necessary to have an 18-inch pipe and two 10-inch pipes in the district?—I do not know.

3078. If they end at Southwark-street, would the large pipes be necessary?—If they want to serve other streets towards the Elephant and Castle, they would go down that way. The thoroughfares in that part of Southwark have been anything hitherto but direct or wide thoroughfares. Union-street is a narrow place in parts, and not at all a good place to take gas pipes through; and, then, if you go next the Thames and Bankside, that is a very inconvenient place, and subject to the interruptions of trade. Then, if you come through another intermediate street, Gravel-lane and Holland-street, and that direction, it is very tortuous.

3079. The Metropolitan Board of Works have made a very handsome street, so that even if you do not go under the subways, but only under the pavement, that would be a great advantage to the companies in taking their mains along?—In many cases it will.

3080. It would in Southwark-street?—Yes.

3081. Have you heard of any flood at all in Southwark-street, in the subways?—Yes.

3082. Before the subway was made?—After the subway was made.

3083. Was that flooding to a great extent?—I heard it from one of our workmen. I did not hear the extent, but they told me it was flooded; it may not be the case when the main drainage is carried out.

3084. Viscount *Grey de Wilton.*] At what time of the year was that?—During the high tides of the river.

3085. Was it under any peculiar circumstances of the river?—It was three or four months ago, to the best of my recollection.

3086. Is the subway below high flood?—I believe so.

3087. Mr. *Powell.*] How do you account for the flooding?—I do not know how to account for it.

Mr. *Johnson.*] I think Mr. Simpson has been misinformed. Mr. Bazalgette tells us that it is not so.

3088-9. *Chairman.*] You said it was liable to be flooded?—Yes.

3090. In Southwark-street, would it be necessary to put two mains of water merely for the benefit of the street. Supposing you only supply Southwark-street, must you have two mains?—I think it would be advisable to have two; I should put one on each side, and leave the gangway open.

3091. You would not put any main of unfiltered water, would you?—They have not arrived at that luxury on that side of the water; in Belgravia it becomes a matter of necessity, from the large extent of high service; we find that necessary, because we have to keep it at a constant high pressure; it requires a high pressure, from the fact that there is so much more water used than in ordinary houses.

3092. Two common mains would be sufficient for the supply of the houses in Southwark street?—Yes, for the houses alone.

3093. And for manufactures?—I do not know to what extent manufactures will be carried on; I dare say they will want a large supply.

3094. Mr. *Powell.*] What was the size of the sewer you saw in Montmartre,

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in Paris?—Speaking from recollection, I think it must have been six feet wide and about six feet high.

3095. About three feet radius; was it circular in shape?—When I saw it, it had an arched top, and there was a sunk part in the bottom.

3096. What was the length of that?—I do not know.

3097. How was it ventilated?—There were openings in it. The part I went to was a staircase of five feet wide, with a door.

3098. Was the door kept closed, or left open?—It was left open when I went there; on the three occasions I was there, it was open.

3099. What was there in the subway when you were there; was sewage running through it?—Dirty water was.

3100. What was the size of the pipe?—To the best of my recollection, it was about eight or nine inches in diameter.

3101. Was it a water pipe?—No; a gas pipe.

3102. I do not understand you to say that it was a smell of gas that you smelt in the subway, but rather a smell arising from the sewage?—It was distinctly carbonated hydrogen gas.

3103. Do you consider the use of lead pipes for water purposes favourable or unfavourable to health?—It depends entirely on the quality of the water; if you have water containing a very small portion of sulphate of lime, it is a sufficient protection, but if you have water containing free carbonic acid, it is a very bad thing, and you ought, properly, not to use lead pipes. Some years ago I had a good deal of trouble with that, and I was induced to apply to Professor Brand, and from his experiments there appeared to be a very small quantity of sulphate of lime in the water. Whenever sulphate of lime was present, we were not able to detect the presence of lead.

3104. Are lead pipes used extensively in the water system of London?—Probably 99 pipes out of 100 are lead.

3105. Can they be used with safety to health?—I do not know about that; we have no distinct cases in our district, although in other districts there are cases. There is an instance of a kennel in Windsor Park where the dog suffered paralysis of heat. We have an instance of a French family at Claremont; we found, when we filtered that water, and it acquired sulphate of lime, that we could not detect the presence of lead.

3106. *Chairman.*] It did not affect the English people there, did it?—I doubt whether the English people there drink much water.

3107. Can you describe the section of the subway at Hyde Park Corner?—I believe it is a mere hole terminated at each end of it, but the place has been so altered now that it would be very difficult to find it.

3108. Have you any knowledge of coal mining?—No further than going into the coal mines. I very often go into them.

3109. Viscount *Grey de Wilton.*] I wish to refer to an answer you gave with respect to ventilation. You heard that at each end of the Southwark subway, there was one of the lamp-post shafts, and you have heard that it is the opinion of gentlemen connected with coal mines, that it is necessary to have a current of air going at the rate of a mile and a half to two miles an hour; would that remark apply to the subway, because you are aware that in coal mines there is one, but never more than two shafts, and that the ventilation is entirely artificial, by means of brattices and ventilation doors, but in the case of the subway, there is nothing artificial about it, and in addition to these shafts there are gratings admitting the air at a distance of every hundred feet; that would hardly apply to the case of subways, would it?—I look upon those shafts in the streets, in many states of the atmosphere, as nothing.

3110. What do you say as to the number of ventilating holes that might be multiplied in it?—You may open the whole street, and do no good. I have been in wells in which I have had a good deal of experience, when I have found carbonic acid lurking about me, and a sensation of pins and needles, and that has been open at the top.

3111. Wells are a great deal deeper than the subway would be?—Some of the wells are shallow. Ventilation is a difficult thing to deal with. You may imagine it is a simple thing; but if you apply lamp-posts with 4 or 6-inch shafts, in my estimation they would be useless.

3112. I can understand that if you were confined to those lamp-posts at those intervals, that must be the case?—It is an apology for ventilation; it is a difficult thing

thing to ventilate subways in London; the people living round would object. Even sometimes I have wanted to put gauges in, and I have offered them sums of money; but the people in London think they are very intelligent, and fancy there is some magic in it, and some difficulty, that you cannot anticipate, is sure to arise. The builders would object to it; they would say it would affect the letting of their property. *J. Simpson, Esq.* 13 May 1864.

3113. Mr. *Toulmin Smith.*] What is necessary for ventilation is motion in the air?—Yes, absolute change; and it is not only from the gas, but there is a great deal of deleterious matter in the streets of London.

[The Witness withdrew.

[Adjourned to Thursday, the 26th instant, at Twelve o'clock.

Jovis, 26° *die Maii* 1864.

MEMBERS PRESENT.

Mr. Du Pré.
Viscount Grey de Wilton.
Mr. Floyer.
Sir Baldwin Leighton.
Mr. F. S. Powell (Cambridge).

SIR BALDWIN LEIGHTON, Bart., in the Chair.

Mr. *Phinn* stated that in consequence of what had passed during these proceedings, his clients had reconsidered the whole structure of the Bill, and they proposed to confine the compulsory powers to subways already made, or authorised to be made, to impose an obligation on the Metropolitan Board of Works to enlarge any subway if needful, to insert in the arbitration clause principles for the arbitrator's guidance, in assessing the compensation payable by the Board; namely, that there should be taken into consideration on the one side, the advantages to the public from the subway, and, on the other side, the pecuniary benefit derived from the construction and use of the subways by the companies (*handing in copies of the Amended Bill to the Committee*). They had tried to put that into shape; but whether successfully, or not, he did not know.

Mr. *John Frederick Bateman* sworn; Examined by Mr. *Denison.*

3114. YOU are an Engineer of some water experience?—Yes, I am; I have constructed works for about 2,000,000 of people at one place or another. Mr. *J. F. Bateman.* 26 May 1864.

3115. You constructed the Manchester Waterworks?—I did.

3116. Have you turned your attention to the question of putting pipes in subways in London?—Yes, I have.

3117. Before we go into the details, will you just state the general conclusion that you have arrived at about them?—I am naturally favourable to the introduction of subways, if I could see my way to their being made available for the introduction of water pipes, but I see so many difficulties, that I am afraid it would be hopeless to carry them into effect.

3118. We are desired by the altered Preamble to this Bill, to confine our attention to three or four existing subways, and those now in course of construction; you have turned your attention to them?—I accompanied the Com-

Mr *J. F. Bateman.*

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mittee through the two, which have been constructed, on the day that they inspected them.

3119. We will take things in the order in which they have been taken hitherto; first of all, as to the question of the escape of gas; have you come to any conclusion on that?—I think it would be very dangerous to have gas pipes in any confined chamber or passage.

3120. Do you, from your great knowledge of pipes, believe it to be possible to ascertain immediately where an escape of gas does take place if it does take place?—I do not speak so particularly about gas except from the observation which any man may apply. I think it would be very difficult to tell where gas was escaping in a long passage or covered way like a subway. In Glasgow, when we were laying down the pipes for the supply of water from Loch Katrine, gas escaped from a pipe at some distance into a vault which I constructed for the purpose of containing the valves of a water pipe, the gas exploded, killed one man, and injured several others, and destroyed a portion of our works. It blew up the roof of the vault, and removed our pipes. There were no gas pipes in the vault, nor within some distance, but the gas had found its way into the vault and had accumulated there.

3121. You, possibly, can form some opinion upon the cost of saving which I see is now put into the Bill as a thing to be assumed?—In the case of water pipes, there certainly would be no saving in the cost of laying, and there would be greater attendant expenses which do not now exist with respect to inspection.

3122. Just take the laying first; you have had some experimental means of giving an opinion upon that?—I have several cases in which pipes have been laid in what are substantially subways. In the case of the Glasgow Water Works, between the service reservoir and the city, about eight miles from Glasgow, there is a tunnel about 400 yards in length, in which two 36-inch pipes were laid. The dimensions of the tunnel were 10 feet by 7 feet; they were the smallest that were consistent for the introduction of these two pipes. The cost of placing those pipes was very much greater than it was in the open country, and was attended with great inconvenience; the men were almost suffocated by the melting of the lead, which they had to melt for the running of the joints, and the thing was altogether a disagreeable operation. In another case on the same works, I have a tunnel prepared for the introduction of two 48-inch pipes and one 36-inch pipe. One of the 48-inch pipes only has been laid in that tunnel; the dimensions are 12 feet wide and 10 feet high, which are the smallest dimensions consistent with the introduction of those three pipes. One pipe only has been laid, but the tunnel is prepared for the introduction of the other; the pipe that is laid is laid upon small blocks. Notwithstanding that the tunnel is a short tunnel (I should think not more than 150 yards; I forget the exact length), and open at both ends, the laying of the single pipe was attended with a considerably greater expense than it would have been in the open country.

3123. Are there any service pipes there?—In these cases there are no service pipes whatever. The dimensions are those strictly required for the introduction of these pipes alone, and if service pipes had to be introduced the size would be insufficient.

3124. Viscount *Grey de Wilton.*] How was that first tunnel ventilated?—It was open at both ends, and there was one shaft. The ventilation, I admit, would not be as perfect in that tunnel as it would be in a subway.

3125. Was that a tunnel which ran through a hill?—It was driven through a hill which I found between the reservoir from which the water was taken and the country below.

3126. Mr. *Denison.*] When you say, "open at one end," you mean open on a level?—Open on a level; a great open straining shaft, where the strainers were 60 feet in diameter.

3127. I do not profess to be a good engineer, but that seems to me as if it would produce a good deal of ventilation?—I think the air passing through a tunnel like that would give more perfect ventilation than in either of the subways I saw. Ventilation is not secured by a great number of openings, but it is rather disturbed. To have ventilation, you must have the current all in one direction.

3128. When we talk about ventilation, it is not such ventilation as would keep the air right if there was no gas, but it would simply carry it right off?—It must

must not be merely fresh air introduced at 50 different points, but a current of air in one direction which would carry the foul air away.

3129. In fact, a wind which one could feel?—What is equivalent to a wind. The ventilation which is called ventilation in the two subways which I saw, is totally different from that which we have to introduce in driving tunnels and that which is employed in ventilating coal mines. There, the air has to be carried either along one passage only, and that passage has to be divided into two, or a tube to convey either the foul air away, or the fresh air into the working is carried through it; but there must be two distinct passages to secure ventilation.

3130. In this case, besides the ventilation of the main subway, there are all those side-passages to be disposed of?—Here I do not know what ventilation would exist. It is quite possible there might be 20 or 50 yards of this subway in a perfect state of ventilation, and in another 50 yards it would be broken up into small portions or cut up into pieces. No system of perfect ventilation can exist in the subway that I saw.

3131. We have had a witness here who suggested artificial ventilation by machinery?—That is very frequently done. Artificial ventilation is generally introduced by two means in driving tunnels; one is to propel fresh air through a tube to the point at which the workmen are mining, and the foul air comes back as the fresh air is drawn in; the other way is to exhaust the galleries or tunnels, or whatever they are, of the air contained in them, by heat, so as to create a current in that direction; but when you do that you must have another channel to introduce the fresh air, in order to introduce a continuous current.

3132. Would either of these contrivances be found in practice to answer in the streets of London?—You must introduce furnaces at different parts, if you introduce fresh air.

3133. Mechanically, it could be done?—It could be done. You must have chimneys in every street, and furnaces.

3134. Without that, would the ventilation be effectual?—Certainly, there would not be sufficient ventilation to keep the subway pure which I saw, in case there were gas pipes introduced.

3135. Now, with regard to the question of cost; with this experiment of your 400 feet subway, you must have knowledge of the cost at which these things could be done, that is, the cost of making the subway and laying the pipes in it?—The cost of laying pipes varies according to the size of the pipes.

3136. Take any size you like?—I have just had put into my hands the cost of the pipe laying in connexion with the Glasgow Waterworks.

3137. You can take a 24-inch pipe?—The cost in laying a 24-inch pipe, including the cutting of the trenches, is about 5*s.* 6*d.* a yard, and making the streets good.

3138. The *Chairman.*] Is that at Glasgow?—It is; but it is about the same everywhere, except you have difficult ground to cut through.

3139. The price of labour varies from 12*s.* per week to 20*s.*, does it not?—I do not think the price of labour makes a great difference; my estimate, and the estimate I see here of four contractors, was 9*s.* 6*d.* for the whole work of cutting the pipe-trench, and laying and jointing the pipe; of that, 5*s.* 6*d.* is for the cutting of the pipe-trench, and re-laying the street. The work was contracted for 6*s.* 2*d.* against 9*s.* 6*d.* I have not the proportion of cutting the pipe-trench, but 5*s.* may be taken as the cost of cutting the pipe-trench and disturbing the street.

3140. Now, will you compare that with the cost of the subway?—The 9*s.* 6*d.* which would be the cost of laying and jointing in an open street, would probably be 50 per cent, or more than that, in a subway. I will state how it occurs. In a street the pipes are brought down alongside the trench to the place where they are required; they are lowered down into the trench as easily and as conveniently as anything can be; in a subway they would have to be taken in with inconvenience at some opening then carried along the subway to the spot at which they were required, and if the subway was already partially filled with pipes it would be an exceedingly difficult and expensive operation to lay them in the places in which they are required. I think the cost attending handling would be at least, on the average, double in the subway to what it would be in the open street. That would nearly as possible make up for the saving in the cost of cutting trenches and making the street good. Then, that is not the only inconvenience. At present we can make the branches with as large a curve as we can get to get round the corners of a street. In a subway we are confined to

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12 feet in width and six feet in height; we shall have to make them all right-angle branches, which will increase the friction of the water through the pipes; how you are to do when you come to points of intersection with 24-inch pipes, where you have to cross, and where you have to lay down the distributing pipes, and all the other connections which are requisite for a proper system of water-pipe, I really do not know; it would be impossible.

3141. And still more if we are to leave a tramway along the subway, which is the scheme proposed?—I have thought it well over, and I do not see how it is possible. I think we have the right to treat London upon a large scale. It is a place with 3,000,000 of inhabitants, and the arrangements for supplying London ought to be considered as equal in magnitude to those which have obtained in Manchester and Glasgow, which are places of about 500,000 people.

3142. Take such streets as the new Southwark-street, and the street from the Mansion House and the Thames Embankment; we may take them as classes of our streets requiring large mains?—You must look to the future. If these subways are made, and it becomes necessary to enlarge the arrangements for distributing water in London, it may be that one of the very streets, in which a subway is laid, is the street down which two or three large water-pipes would have to be taken.

3143. Have you got a map with you showing that?—I have got here a report, upon the state of the piping of Glasgow, which will at once illustrate what I wish to say upon that point.

3144. Mr. *Powell.*] Is that your report?—It is my report made in 1858. We have, in all cases of waterworks, to provide for the future. The water from Glasgow comes in at the west end of the city. The city is growing very largely, and the water is now conveyed to the city by two lines of 36-inch pipe, one passing along the Mary Hill-road, and the other passing along another road called the Great Western-road. They diverge, soon after leaving the reservoir, and meet again at a convenient point, where they are united; so that in the event of one pipe getting out of order the other may supply the district which the one which is out of order ought to supply. Therefore, at some point or other, in all waterworks you ought to have the pipes coming together, or connected by an equally large pipe. Glasgow is divided into four districts, which are supplied at present by two pipes. The blue pipe upon this map, which brings water to the higher part of the City, is intended for the supply of the district upon this map coloured blue, and the two districts coloured brown. The red pipe is intended for the supply of the district coloured purple, and the district coloured red. When the pipes become insufficient for the supply of the water required, two additional pipes of 36-inch diameter will be laid side by side with the other. Therefore, each of those great streets will have two 36-inch pipes in them. One of those new 36-inch pipes will pass along by the side, all the way through the district coloured blue, and part of the district coloured red, into the brown. So that through the whole of the City nearly, from west to east, we shall have the existing large pipe, and another 36-inch pipe laid alongside. The purple district will not be dealt with in the same way; because the red pipe will continue to supply the red district, and the new pipe will supply the purple district; so that the fresh pipe will not pass through the whole City in the same way. Those are arrangements which I think ought to be contemplated with regard to London.

3145. Is it your opinion that in these existing subways there will, in all probability, be a necessity for the pipes of different services running side by side in the way you have described there (*referring to the Plan*)?—Yes; for instance, take the Thames Embankment, which is at present unoccupied by pipes, and it is free from any arrangement which can be made for anything which has to be introduced, which is not the case with the new streets. The water is brought in by several companies, and would naturally be carried by the different companies, if it could be arranged, along the new street of the Thames Embankment: first, for the supply of the centre of London, and then for the part further east, if the water from the west were brought to those districts. It may be, that if London can be divided into districts, it will save a good deal of what I am now suggesting. I am sure that when London comes to be systematically and properly piped by the companies in combination, that a good deal of what I am stating in the case, with regard to Glasgow, will be required for London.

3146. Are

3146. Are the streets, which are wide streets, and free from any existing pipes, such as are likely to invite pipes to be laid down in them?—Wide and straight streets, unoccupied by existing pipes, are those which will naturally be selected for the introduction of new pipes.

3147. As to the cost of constructing the subway itself, I suppose you have some knowledge with regard to that, from your experience of the one of 400 yards, which you have referred to?—That is the case of a tunnel; I heard Mr. Bazalgette's estimate, which amounts in round numbers to 20,000 *l.* a mile.

3148. He would not allow it to go to 20,000 *l.*?—About 16,000 *l.* a mile.

3149. That is taking how much per yard?—£.9 for a yard. I have not gone into the estimate minutely, but the estimate which has been prepared by Mr. Simpson, gives a much larger sum than that; I think double.

3150. From your Glasgow experience, which do you think is right?—I think Mr. Bazalgette's is too low, and Mr. Simpson's is too high.

3151. What would you strike as the balance?—I think such a subway as I have seen would cost 30,000 *l.* a mile.

3152. We have had it stated at 10 *l.* 18 *s.* per foot, which has been divided by Mr. Bazalgette into 3 *l.*, but that included the vaults. We have not got a single instance of what I would call a nett subway, without anything else constructed in London?—Mr. Bazalgette's estimate includes, first of all, the whole cost of what has been expended in the street, including the subway with vaults and cellars, and then he divides it into different proportions.

3153. How it is to be divided is not a question of fact, but of opinion?—It may be a question of fact. I do not know about very much of the expense which would necessarily be incurred in a subway.

3154. At any rate, the only certain datum we have is 10 *l.* 18 *s.*, including the cellars?—Yes, subject to a deduction for cellars.

3155. Have you the cost of your 400 yards of subway?—No, I have not; but that was driven through sandstone rock, and would, probably, have cost about 6 *l.* per lineal yard of 2 *l.* per lineal foot. It did not require arching, and would be a very favourable ground for tunnelling through. I have a note here of Mr. Bazalgette's evidence, that it was 10 *l.* 18 *s.*, of which he estimated 7 *l.* 18 *s.* was due to the vaults, and 3 *l.* a foot to the subway. The work was beautifully done, particularly in the Southwark-street Subway, and reflects great credit upon Mr. Bazalgette, and the people who constructed the works. It may be that he does it for the money.

3156. Assuming that Mr. Bazalgette does it for 3 *l.* 12 *s.* 6 *d.*, which he got up to at last, would those subways that you saw be sufficient for such pipes that would, probably, have to be laid in the Southwark-street, the Thames Embankment, and the street from the Mansion House?—It is very difficult to say. I have never minutely studied the question of piping the City of London, and I would rather leave that to those who are the engineers of water and gas companies. With respect to the Thames Embankment, I should look upon that as a very likely place to have all the different pipes, as soon as possible, removed to, and laid in.

3157. I do not know whether your experience at Glasgow agrees with that of Mr. Simpson's here, about the wages which the workmen require for working in these places?—We had great difficulty in persuading the workmen to work at all, in the instance I have mentioned. They came out as black as sweeps, and they did not like it at all; and we had to give them higher wages.

3158. You mentioned, incidentally, some time ago, the valves which you used?—In the case of small pipes, valves are simple matters; but when you come to deal with pipes of large dimensions, then you have to introduce machinery of considerable size; for instance, I have here before me a tracing of the valves which were introduced in various places in Manchester and Glasgow. That (*referring to a Plan*) wants a vault as large as this room; that is not in general applicable.

3159. We will not dwell upon anything that would not be likely to be applied to these streets. Will you explain to the Committee the sort of thing which would be required here?—These are tracings of our 36-inch pipes.

3160. Such as are now used in many of the streets of London?—Yes, I have miles of 36-inch pipes. These would require a space which could not be obtained in these subways. I may first explain the reason of introducing this sort of valve. A 36-inch disc, pressed upon anything like 100 or 200 feet of water-

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pressure, is a very difficult thing to move. It cannot be moved by one or two men; it requires the intervention of machinery, and the intervention, also, of other arrangements, reducing the pressure upon the valve. In the cases, both of Manchester and Glasgow, where many of these 36-inch pipes are introduced, I divided it into two discs, one small one, which could be easily opened, by at most two men, and the other after the first is opened; but it is all done by machinery, so as to give extra power. This is a vertical one, and wants a height of nine or 10 feet. I have another, of the same sort, which is placed horizontally; where the height is not sufficient (*producing another Tracing*); this is placed horizontally; that is where the height under the street is not sufficient. That, itself, occupies 4 feet 6 inches or 5 feet, for I take headway besides. Pipes are ordinarily covered three feet. (*Witness explained the Plan to the Committee.*) This is the same arrangement, but vertically; this wants about 11 or 12 feet in height; these have been introduced everywhere where I have done large works, but I could not put them into subways at all.

3161. Have you stated what the object of them is?—We must have abundance of valves. In order to have a sufficient command over the water I put one of these large valves on to large mains at every mile and a half; and when you come into the streets of the city, you must put a valve wherever a branch takes place. Every district must be commanded by a valve. You may have one valve or half a dozen valves. In many cases I built vaults for the purpose of introducing all the valves I could for the purpose of the convenience of inspection. That could not be carried out in these subways; you are confined to a certain height by the sewer below and by the arch above, and you are confined in width by the sides of the subway.

3162. In all this evidence you have said nothing about the service pipes, but that subject I understand you to leave to others?—Yes. I shall go on with these large valves; and with regard to the distributing pipes, when you have to stop a large column of water, you stop it in motion, and there is a large amount of momentum at once arrested; it comes with an increased pressure on the pipes behind. For the purpose of relieving that, in all large pipes, I have introduced what I call momentum valves, which relieve the pressure of the water upon the pipe.

3163. Something like, in fact, the hydraulic ram?—Yes, very much, in which you save the pipe from bursting; but you want room for these means of discharging the water; no arrangement of that kind whatever can be introduced into these subways. Another very important thing in connection with them is the absence of any mains whatever for carrying off the water in the case of the bursting of a pipe. The bursting of a pipe of large size, under considerable pressure, makes a terrible piece of work. There is no accounting for many of the bursts which take place. I know several cases of pipes, which have been in service 12 or 15 years, bursting without any apparent cause; they come into the streets now, and if they burst they wash the street, and the water may get into the cellars, and do comparatively little mischief; at all events, it is small as compared with the mischief which they would do if they burst and filled up one of these subways.

3164. I do not at this moment see how the subway is to be cleared of the water?—I do not see how that is to be done myself. There are a few stench-traps which they suppose may be sufficient to take off the water, but they would soon be choked up. In many cases, when I have come to a hollow in the street where I have a large pipe, I make a special provision for carrying off the floods which would be occasioned in the event of a burst. I could point out means which I have introduced upon each side of the road for the purpose of passing off floods which might be generated by the bursting of a 12-inch pipe, such as openings of 10 feet in length and about a foot in width. That has been found insufficient. There is another point which I should like to refer to, which might be passed by, as to the inspection. I mentioned formerly that the quantity of inspection would be materially increased; in the case of water pipes laid in streets, it is thrown upon inspectors. If a pipe bursts, you can tell from the surface instantly where it is. A pipe might burst in a subway, and a leakage occur, without being discovered for some time. A man constantly perambulating the subway would be the only effectual way of discovering the leakage of a pipe.

3165. Looking at all these things together, the expense, safety, and the rest, should you, as an engineer, chiefly with a view to water, desire to carry out these things,

things, if it were possible to do so with safety, to adopt even the small extent which the Bill now asks the Committee to adopt?—As a matter of fact, with proper provisions I think they might be introduced; but it would not be a matter of economy, nor do I think that, all things considered, it would be worth the expense. Certainly the water companies would not save anything; there would be the whole cost of the subway added to the cost of pipeage.

3166. When you say they would not save anything, you mean if they are made a present of the subway?—If they are made a present of the subway they would not save anything.

3167. The scheme of the Bill is to make them pay a rate, for that word is still kept in the Bill?—I have not seen the Bill since it has been altered.

3168. I think that is Clause 9 which has not been altered?—That would be a hardship upon the water companies, inasmuch as they would not save anything, and they would be put to greater inconvenience than that which they are now obliged to undergo.

3169. Even if the thing was done with Mr. Bazalgette's insufficient estimate, as you think?—Assume Mr. Bazalgette's estimate to be sufficient and to be quite enough, I do not think that any advantage would be gained commensurate with the expense.

3170. We have had people coming here and saying that the work was likely to be done better than in the open ground, by reason of the inspection?—The work would be better done where it is all open to the daylight, and where an inspector as he walks along can see the work.

Cross-examined by Mr. *Wilkinson.*

3171. We know that you have had very great experience as a water engineer. I think I understood you to tell my learned friend that that experience has been obtained chiefly in Glasgow and Manchester?—No, all over the country; all over the world, in fact.

3172. Your experience has not extended to London?—No; I have done no work in London connected with waterworks.

3173. In the answers which you have given to my learned friend, have you quoted the experience of any other place than of Glasgow?—Yes, I have quoted the experience which has resulted from the supply of water to probably 40 or 50 different places; but I mentioned Glasgow and Manchester especially, because they come, in point of scale and magnitude, more nearly to London than other places.

3174. I understood your answers to have been derived from the general experience, but the specific illustrations which you have given my friends have been from Glasgow entirely, have they not?—From Glasgow and Manchester.

3175. And they have been confined to those two cities; is that so?—The specific illustrations which I gave have.

3176. I understood you to state to my friend, just now, that with proper provisions, safety might be insured; did I understand you in that?—What I said, if I remember correctly the question, was this: I was asked to draw a comparison between the safety of a pipe in a street and the safety of a pipe in a subway, and I think I answered upon that, that I thought safety might be secured in the one case as much as in the other.

3177. Do I understand you to say, that safety would not be more effectually secured in a subway, with proper provisions, than in the present system?—I do not think it would.

3178. Do you go so far as to say that it might be equally secure?—I think it might, with proper inspection.

3179. So that, on the score of safety, you do not see any additional risk from the use of subways?—No.

3180. Will you be kind enough to show me, first of all, the system of valves which you were describing as being used in Glasgow. I understand you to object to the subways, that there would not be room for the introduction of valves of the size which would probably be required; is that so?—Yes. Here are two drawings of valves. These are drawings of valves, supposed to be introduced in Glasgow, but they are exact copies of what were first introduced into

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Manchester and elsewhere, where there were pipes of equal sizes. These are 36-inch pipes.

3181. What is the object of these valves?—The object of these valves is to stop the water and to turn it in a different direction.

3182. Is the town of Glasgow supplied from one source only?—From the north side, from one source only.

3183. How many sources has Manchester?—One source only.

3184. Then these valves, I presume, have reference, as you have already told us, to that particular case of the supply from one source only?—Valves have reference to every case.

3185. These valves, to which you have drawn the attention of the Committee?—The valves have reference to all pipes of 36 inches diameter; the system of valves has reference to all pipes wherever I have put them down to 21 inches in diameter. Then, after that, I introduce the valve which is commonly used in the country.

3186. Is this the valve which is commonly used (*referring to the Drawing*)?—No.

3187. Are you aware of any instance in London in which a valve is introduced?—No.

3188. You have told us that there are no such valves as these in London?—I do not know that there are no such valves.

3189. You do not know that there are no such valves in London?—No; valves of that kind were first introduced in the Manchester Waterworks.

3190. *Chairman.*] By you?—By me; and they have since been copied very largely by other people, but they were first introduced there.

3191. Mr. *Wilkinson.*] When was that?—Fifteen years ago.

3192. In Manchester where are they placed?—All over the city.

3193. How do you arrange them?—On the line of a main, which is a 36-inch main, they are placed at every mile and a half, or thereabouts, until they reach the city; valves of a similar description are introduced into pipes down to 21 inches in size; and, with regard to pipes of larger size, they are introduced all over the city.

3194. What room do you say that you require for them?—We would require a vault for the use of these large valves, if they are placed horizontally, of about 10 or 12 feet wide for themselves, and they would block the passage of anything else.

3195. You told me that they occur at every mile and a half?—Yes, on the main pipe, before it enters the city.

3196. When it enters the city, do they occur?—When it enters the city they occur also.

3197. At what intervals?—On the large main, so soon as it passes through the city, the intervals are shorter; but, at every point at which a pipe of any size leaves another pipe, there is a valve.

3198. Will you be good enough to explain how you provide space for the accommodation of these valves in the streets, as they exist now?—I have never found any difficulty; I have the whole street to select from; I have put them higher or deeper in the street, or one side or the other, in order to avoid sewers, or gas pipes, or anything else which may be in the way; I have not been confined to any particular space in the street.

3199. Does it occur to you that there would be any more practical difficulty in affording the same room in a subway, which the present street presents?—Yes; because a street is practically narrowed to a street of 12 feet in width, instead of a street, as it may be, of 60 feet in width. That is one of the great inconveniences of subways.

3200. Are you aware that, as the Bill is amended, the Metropolitan Board of Works undertakes the liability of enlarging the subways as may be required?—No, I am not.

3201. With that liability imposed upon the Board, will that remove the objection arising from the want of room for these valves if they should be required?—No; they could not find space for the valve; they would absolutely occupy the whole subway.

3202. Is it not the fact that a main in the subway would be at a lower level than your present main, under the existing state of things?—Rather; but we have the whole surface up to the houses to work in.

3203. You would not put the valve above the streets?—No; but we are confined

confined here to the top of the sewer, the arch; we have a height of six or seven feet to work in, and we have a breadth of 12 feet to work in, according to the subway which I have seen; supposing we were not in a subway, we should have a width of street of 60 or 70 feet, and a depth down to as low as we wished to go.

3204. Supposing the valve chamber to be constructed, of course it must be covered in?—Yes.

3205. It would not be possible for you to take the ground above the existing surface of the street to cover it in?—We must do the work first, then turn it in afterwards; it is all open till the work is finished.

3206. Does it not follow then, with regard to the street itself in its existing state, the main being lowered, and having the facility of going as deep as you please, that there would be greater room in a subway than you could possibly get in the street itself?—That is absolutely impossible. If I am cabined, cribbed, and confined, I cannot have the same space as I could have, supposing I was working in the street, where I could get what depth I require.

3207. You cannot go above the surface of the streets?—I can, for the purpose of working, which is very essential. I can bring the valve on the surface of the street, to lower it to its place.

3208. When the valve is constructed?—In the case of vaults, such as I introduce for the purpose of this valve, you do not put on the roof of those vaults until the work is complete; therefore, you have all the space for the machinery to work, to lower it into its place.

3209. I understand you to say, that you do not put on the roof of the vault until your work is completed, is that so?—It is so.

3210. Why should not that same facility extend to a subway?—It might.

3211. Then, if that be the case, as I understand you, your main itself would be lower, and that in itself would be an advantage?—The main is not necessarily lower.

3212. Supposing it to be lower, would it not naturally give more room for your chamber?—Yes, if that were so, no doubt it would; but most of these valves require a depth below the level of the street of about 10 or 12 feet, and wherever I can get that depth, and put them vertically, I have found the valves answer at that depth.

3213. Then, if I gather your explanation right, all that you do now in the streets may be done in the subways?—No.

3214. Supposing that the subways are left open until the work is done, and supposing, also, that the obligation is upon the Board of enlarging the subway, so as to admit of such valves, if hereafter they should be required, do you mean to say that there is greater difficulty in executing that work in a subway than there would be in a street?—I mean to say, that unless you widen the subway wherever valves are required, that would be an expensive obligation.

3215. Are you aware that the Board undertake that obligation if required?—I do not read the word "enlargement" in the way that you do; the enlargement of a subway is a general enlargement and not a local one, for particular purposes.

3216. You think that the terms of the obligation are not sufficient?—What I said was, that the words, as you read them to me, or reported them to me, are not, as it appears to me, large enough to include any local, or may not necessarily include any local enlargement; it must there mean a general enlargement of a subway.

3217. Would, in fact, a general enlargement be necessary to effect this purpose; you say that in your chamber there are intervals at a mile and a-half, or something like that?—I have told you that at every place ———

3218. Is it not somewhere about that?—Will you tell me what your question is, because I am interrupted before I finish my answer?

3219. I understood you to say that this is not in London at present your knowledge?—This particular kind of valve is not, so far as I am aware, but a valve of the same character has always been in use in London; the only difference is that this requires rather more space than the valve which is in use in London. A pipe of 36 inches in diameter must have what is called a bonnet, into which the disc, which stops the pipe, must fit; you cannot have them of that size, with all the existing pipes in London, because they require a space of six feet in depth. If they cannot get that space vertically they must get it horizontally.

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3220. That would apply to a 36-inch pipe?—To every pipe; every branch has a valve here. There is no difference in the system here except in the character of the valve.

3221. And the size of the chamber required?—And the size of the chamber required.

3222. All your answers are given, as you have told us, with reference to a 36-inch pipe?—This particular illustration is.

3223. Do you know how many 3-feet pipes there are at present in London?—I do not; but my answers, in all respects apply, as I have said frequently before, to pipes of all sizes; this particular character of valve I have introduced with reference to pipes of 21 inches in diameter,

3224. *Chairman.*] Main pipes?—Every pipe; not main pipes only, but every pipe; branch pipes as well as main.

3225. Mr. *Wilkinson.*] Wherever there is a junction?—Wherever there is a junction. You are obliged to have them on the branch mains, or you could not shut off the water from a particular district if you wanted to do so.

3226. You, therefore, want a space to accommodate a larger chamber?—That is one of the difficulties.

3227. Now, you tell me that you are not aware that there are many 3-feet pipes?—Yes, I am aware there are many.

3228. Are you aware that there are any?—Yes.

3229. Where?—I believe there are many 36-inch pipes.

3230. Let us take the subway; is there any 36-inch pipe in King-street, Covent Garden; the subway is empty in Southwark?—They are empty vaults at present.

3231. I suppose you are not aware whether there are any pipes of that importance in the Thames Embankment Subway?—I think I need not answer that question.

3232. This difficulty, of course, decreases in proportion, as the size of the pipe, and the necessary size of the chamber decreases?—Yes; you wish to confine my answer to the chamber only; the chamber is one of the incidental difficulties which I have mentioned, and not my difficulty as to the question as a whole; there is not space enough, according to my notion, for freedom of working, or for facility of construction. The whole scheme, I think, is inapplicable, and is not worth the expenditure which will be required.

3233. That is general. Pray allow me to ask you as to the details. I should not have gone into it at this length, if you had not produced these drawings as illustrating the difficulties arising from these subways. You do not think that is the only difficulty or the greatest difficulty?—I did not say anything about the greatest. I said it was one of the difficulties. I can enlarge upon difficulties to a greater extent if you wish me to.

3234. Would there be any engineering difficulty in constructing subways?—Engineers admit of no difficulty.

3235. You are an engineer yourself of experience; do you really mean to suggest that there will be any practical difficulty at all in constructing the necessary chamber in a subway?—No; I could make a chamber of any size, and I could put in a pipe of any size; and, therefore, there is no engineering difficulty in that sense.

3236. Would the effect of there being a variety of supplies, as you are aware there are in London, at all affect this question of the size of the pipes and the valve?—It would. It reduces London, practically, to eight cities of about the same size as Manchester and Glasgow. There are about eight companies.

3237. That is to say, it would reduce London, by the analogy which you have mentioned, supposing London had only one source of supply, into as many cities the size of Glasgow and Manchester as there are supplies?—It does practically reduce London into eight cities of about 200,000 inhabitants, in the rough, each of those having independent supplies. If it had only one supply, it would multiply the difficulties to a great extent. The New River Company and the East London Company bring their water from the east, the other companies bring their water from the west, and some from the south. Therefore, London, practically, is reduced to so many different points, and so many independent sources of supply.

3238. That brings me to the other illustration which you produced before the Committee. Will you just explain that to me? First of all I understood you to

bring

bring it forward in illustration of the difficulties arising from the necessity of multiplying pipes for future prospective supply?—You mean collateral pipes?

3239. Yes. Will you explain to me the drawing?—That again is in strict analogy with the future of London, and the future of Glasgow.

3240. There is the material difference, you will admit, that whether London be cut up, for the purpose of illustration into small portions, or, even as it is in London, there are many supplies, and in Glasgow and in Manchester, there is but one supply in each case?—I am asked whether London being cut up into eight different places, does not destroy the analogy between that and Glasgow, where provision has been made for the growth of Glasgow; it is exactly the same.

3241. The growth of Glasgow from one source?—You have eight different sources here, each supplying 400,000 persons; you have one source in Glasgow, supplying 450,000 persons. Glasgow with its 450,000 persons, will grow in about the same proportion of one-eighth part of London, with its 400,000 persons, will continue to grow. Therefore, you must have fresh mains and fresh pipes, in the same time as you have fresh mains and fresh pipes in Glasgow.

3242. The increase of London would, of course, be from the outside?—And so it is in Glasgow; the cases are analagous; each separate eighth part of London has its own separate supply.

3243. I understand you to produce this as an illustration of the difficulty of doubling the pipes inside and not outside?—Exactly so. The New River Water Works has a district which is growing in many directions; it must take its water through one portion to supply another part, exactly as in Glasgow. There is this further difficulty, that the City of London is spread over a much larger extent in proportion to its population, than Glasgow; therefore, the pipes must be extended a longer distance than in Glasgow; I mean the whole of the metropolis.

3244. Therefore, any increased supply would be outside the metropolis, and not inside, and there would be more duplication of pipe in the already crowded parts where the pipes exist?—You may, no doubt, to a great extent, relieve yourself of the necessity of duplicating pipes of the same size by carrying them round into the suburbs as they grow; but in very many cases, pipes of large size will have to pass along the same streets in order to reach the districts which are growing beyond.

3245. Are there any such cases in London, to your knowledge?—Hundreds of cases.

3246. Of 36-inch pipes?—No; I did not say 36-inch pipes.

3247. Now, will you show me the drawings illustrating the difficulty of multiplying them?—Not the difficulty of multiplying them.

3248. Then is your objection simply to the want of room?—My illustration was to show the city of Glasgow service, present as well as future.

3249. Then I am to gather from this illustration that there is no duplication of pipes?—We have in the district these 36-inch pipes at present. (*The Witness explained the Drawings to the learned Counsel.*)

3250. These at present are clearly distinct and different streets?—They are in different streets, but they unite at two points; there are junctions made so that the red can supply the blue, and the blue the red.

3251. That is a junction only?—A junction of 36-inch pipes with 36-inch pipes.

3252. Will you point out any other place where a duplication of pipes occurs?—There are five or six in many of these streets (*referring to the Drawing*). In one street there is a pipe of 20 inches, and in another a pipe of 34 inches.

3253. I understand you to say that this map only shows that it may be necessary to duplicate the system hereafter, and then you apprehend that if the subway were here, great inconvenience would arise from the number of pipes?—Yes.

3254. That is the only use you make of this?—Yes.

3255. I understood you, also, to say that, with reference to the connexion between the supply pipe and the main pipe, there would be difficulties arising from the connexion being invariably at right angles; is not that so?—By the increased friction we should be deprived of the means of easing the flow of the water by the curves which we now adopt.

3256. What difficulty would there be in adapting them?—Difficulty is not the word; there is no difficulty; it increases the friction of the water.

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3257. Why should you not make the connexion between the service pipe and the main pipe, with the same curve that you now make it?—Because there is not space in the subway, and cannot be.

3258. Are you aware of the number of pipes which can be accommodated in the subways as they at present exist?—That depends on the size of the pipes.

3259. Are you assuming the necessity of duplicating the three feet pipes in this case?—No; of course I am not; because the pipes vary from every size; from 36 inches, down to 3 inches.

3260. *Chairman.*] You do not possess any local knowledge of the water and gas pipes in Southwark-street?—No.

3261. Mr. *Powell.*] Have you any personal knowledge, yourself, of London, as regards pipes and districting?—I have no engineering knowledge; I have a personal knowledge, as an observer.

3262. Mr. *Wilkinson.*] You had the advantage of going through these subways with the Committee?—Yes.

3263. Can you tell me the amount of accommodation which you think necessary for the subways?—I can suppose any number of small pipes; and I can suppose any number of large pipes; but I do not know that that is much to the purpose, unless I know the wants of the district, and the size of the pipe required.

3264. Mr. *Wilkinson.*] Then, you are, in fact, unable to give any estimate of the amount of accommodation required for the subways?—For these two particular subways, I am.

3265. Did you say that there would be really no difficulty arising from the want of ventilation in the subways?—Yes; I am sure of it.

3266. So far as water is concerned?—I was asked that question, with reference to gas. I have known the air from the sewers blow through the traps, and blow the candle out.

3267. You mentioned an accident which had happened within your knowledge at Glasgow?—Yes.

3268. There was no gas pipe in the vault at all?—No.

3269. That was an accident arising under the present system?—From the gas escaping into a vault under the present system.

3270. I think you told my friend that you did not speak with any knowledge of gas?—No; I was asked the question as to ventilation with reference to the escape of gas.

3271. You have no special knowledge of gas?—I have the special knowledge which every man has of gas; I am not a gas engineer, and I do not lay gas pipes.

3272. Seriously, do you think there would be any danger, so far as water pipes are concerned, in consequence of any want of ventilation in these subways?—Yes, certainly. If there is nothing but water pipes in the subway, the water pipes themselves will not spoil the air.

3273. I mean, without a water supply would there be any difficulty arising from the want of ventilation in these subways?—Am I to suppose the existence of gas pipes in the subways as well as water pipes?

3274. Yes?—Then there certainly would.

3275. In what way?—In the escape of gas.

3276. Do you suppose that the escape of gas would contaminate the water, and with the gas pipe on one side and the water pipe on the other, that the gas would leak through the pipe and contaminate the water?—I do not suppose that; I have known gas lighted at the end of the water-tank where water was expected to flow.

3277. Having permeated through the soil and got through the joints?—Yes. Therefore, I do not think it an absurdity.

3278. The absurdity I was suggesting was this: one of the pipes being on one side of the subway and one on the other side, but above the surface, do you not think then that it would be absurd to suppose that a leakage of gas would necessarily contaminate the water in the water pipes?—No. An empty water pipe with a bad joint might admit of gas which might be in the surrounding air, and when the water came to flow again in that space the water might be contaminated. I do not think there is anything absurd in that proposition.

3279. That is the extent to which you think the danger would arise?—No, if the

the air was foul, in consequence of the escape of gas, nobody, with safety to himself, could venture, either to examine the water pipes, or to do work there.

3280. Did you remark the provisions for ventilation when you were with the Committee?—Yes.

3281. Did they appear to be ample?—No.

3282. Why not?—They would be found to be totally inefficient.

3283. Your theory being that it is necessary to have a thorough draft from end to end, and that the multiplication of apparatus is not a proper way of effecting ventilation?—It is not.

3284. Would not that rather refer to an escape of gas?—No, the gas might be confined. The day when I was there, there was a thorough draft from every one of those openings, which might have the effect of impounding the air betwixt each down draught, and that might be inflammable.

3285. But supposing there were down draughts; supposing these apertures existed, I need hardly ask you whether multiplying those apertures would not be the ordinary means of affording an escape for the gas, and preventing the danger of exploding; the more you multiply the apparatus, is it the better?—No doubt, but it is not sufficient if you put gas pipes there. I should not think that was sufficient if you put gas pipes, you would have the air as foul as you have in coal mines; you must have a strong current to carry away the foul air; it might be filled with water pipes without gas pipes.

3286. Was your attention called to the shafts at the crossings of the streets; you observed the ventilating apertures; are you aware, in addition to them, that it is proposed that a ventilating shaft should be connected with the lamp posts at the corner of the streets?—I heard that as a proposition.

3287. Would not that be something analogous to that which you yourself suggested?—If there was a furnace there.

3288. Have you been to Nottingham at all to see the system there?—No.

3289. With reference to the cost of laying the pipes; I understood you to say that the cost of a 24-inch pipe was 5 *s.* 6 *d.* a yard run for the cutting up of the streets and restoring the branches?—Yes.

3290. I do not know whether you put the whole expense at 9 *s.* 6 *d.*?—That is my estimate. The work was done for less money.

3291. What was the work actually done for?—Six shillings and two-pence as against 9 *s.* 6 *d.* That was a very low price. All the other tenders which I have here before me were within 6 *d.* of my own price.

3292. *Chairman.*] And the work was well done?—Yes, that was one of the prices.

3293. Have you found a great deal of discrepancy between estimates and tenders?—Yes.

3294. That is generally the case, is it not?—Very often.

3295. Did I understand you to tell my learned friend, that the cost of laying the pipes in the subway would be 50 per cent. more than laying them in the street?—Yes, including "handling."

3296. By "handling," you mean taking the pipes and lowering them down the subway, as contrasted with laying the pipes in the street?—Yes.

3297. In the one case, it being necessary to introduce them through an aperture of one sort, and in the other to lay them down?—It is a matter of opinion, merely an estimate. I am sure the cost would be greater. I think the cost of handling pipes and lowering them down a subway, would be from 50 to 100 per cent. greater than laying them in the open ground.

3298. Can you give me any ground for that estimate?—The pipes are carted, and deposited from the cart on the spot in which they are to be laid; they are then lowered at once into their place, and jointed; cement joints are used, which are used to a great extent in pipes of 18 or 20 inches. The mere cost of jointing pipes is very small.

3299. That would be used in a subway, too?—Yes; therefore, the cost of jointing being small, in proportion to the whole cost of handling and doing the whole of the work, it follows that, if you materially increase the labour, with reference to handling the pipes, that you materially increase the whole cost of jointing. Where you have a subway, and deposit them all in one place, take them through an aperture down a considerable distance, and then have to carry them along the subway; that greatly increases the cost of the labour.

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3300. First of all, your suggestion as to jointing was, that the jointing was to be effected by means of cement?—Yes.

3301. There is no difficulty at all suggested, as to the lead pipes being repaired?—With cement joints, which could be used with pipes of about eight inches in diameter, of straight lengths, that difficulty would be removed.

3302. *Chairman.*] That applies only to water, and not to gas?—They use gas in many places for cementing joints in Manchester.

3303. Mr. *Wilkinson.*] I need hardly ask you whether all difficulty from the flame, and the use of the light, is removed?—Yes; cement joints are applicable to straight lengths; only, wherever you have curves, there you must introduce a lead joint.

3304. Why should they not be applicable to curves as well?—Because you cannot conveniently turn and bore a curved pipe; you must have a straight pipe to turn and bore it; you cannot conveniently turn and bore so as to make the one fit into the other. Cement joints have to be turned so that the spigot may exactly fit.

3305. Would there be any practical difficulty in applying a cement joint in the case of a curve?—It would be possible to do it, but at a greater cost.

3306. Is it practicable?—Practically, it is not practicable, because it would increase the expense for no adequate object.

3307. Is that the only reason, because it would incur expense?—I do not think you would make good joints. It is a thing which nobody would ever think of doing.

3308. Is that the only difficulty, that it would increase the expense?—No, that is not the only difficulty. What is exceedingly difficult, besides turning and boring, to make a good joint with a crooked pipe is, the pipe has to be driven in perfectly straight, and you could not drive the pipe perfectly straight into a joint.

3309. These curves would not occur very frequently?—Very frequently in crooked streets; in straight streets they do not occur.

3310. Now, as I understand you, the 50 per cent. is accounted for; not so much by the jointing, which is but a trifling item, as by the difference between the handling, as you term it, of the pipes?—Yes.

3311. Is that all?—No, not entirely all; if you come to lead joints, which you must have to a great extent, that would increase the expense. I have merely applied cement joints to small points, but if you get pipes above a certain diameter then you must use lead joints. Wherever you have lead joints, then the labour will be greater and the cost greater.

3312. Why would the labour be greater with a lead joint?—Because you have not the same space to work in.

3313. What space would you require?—In a subway you have more difficulty in getting the men to work where they have to melt lead in a confined space, than you would have in open air.

3314. The difficulty, then, is, that you do not get men to work in a subway at the same cost as you get them to work above ground?—You must pay them more.

3315. Have you formed any estimate of the difference in the cost?—No.

3316. Then you cannot state the proportion which you allow for that item?—No; I have stated that generally. I think the cost of the handling and that part of the jointing would be from 50 to 100 per cent. greater in the subway than in the open.

3317. Is there any feature that you look at besides the handling of the pipes and the increased cost to be paid the workmen?—You have got all the elements; the pipe merely requires handling and jointing.

3318. And this you contrast against the taking up of the street and the laying down of the street again, and the paving of the street; have you allowed for paving?—Yes.

3319. Do I understand you to say, that in your opinion, as a practical engineer, the increased cost to be paid for working where lead joints are required in a subway, would be more in amount than the sum you now pay for taking up and relaying the pavement in the streets?—The gross cost on small pipes would probably be less in a subway, and the gross cost on large pipes would be certainly less.

3320. When you use the term "small," what size do you refer to?—About 15 inches, downwards.

3321. *Chairman.*] Do I understand you to say that it would be probably less in a subway for small pipes, but certainly for large pipes?—Yes; I am not quite sure whether 15 inches would be the size. I would rather say for small pipes of eight or nine, or even six inches, it would be less in the subways; but for pipes of 15 inches, or 18 inches, or 20 inches, or 24 inches, it would be much greater. It would increase in proportion to the size, and decrease in proportion to their size.

3322. Mr. *Wilkinson.*] Is this proportion confined to 24-inch pipes?—No, it is not confined to any size.

3323. Fifty per cent.?—I have said from 50 to 100 per cent.

3324. Do I understand you to say that there would not be the same facility for inspecting the working in a subway that there is now in the streets?—Yes.

3325. How is that?—Because these pipes are their own inspectors, and do not cost sixpence for inspection.

3326. Why should they not inspect themselves in the subway?—If they leaked, nobody would know that they leaked in the subway. In the streets, if there is a leakage, it is instantly shown upon the surface of the street, and if there is a bursting of a pipe, it is instantly known by the water escaping; but in a subway nobody knows whether the pipes leak or not.

3327. I suppose the streets themselves will not give notice?—No; but hundreds of people going along a street would see if a water-pipe burst or not.

3328. Would not anybody going along the subway find it out too?—But passengers do not go along the subway.

3329. Are you not aware that there would be officers appointed to superintend these pipes?—But they would have to be paid, and therefore the cost of a subway would be greater than it is in a street.

3330. I suppose the persons who are appointed to set these matters right are paid under the present system?—The people who walk along the streets are not paid.

3331. But you surely do not mean to say that you would depend upon people walking along the streets to give you notice of the bursting or leakage of a pipe?—Yes; the turncocks must go along the streets, and they see whether the pipe is leaking or not.

3332. Do you gravely mean to assert that in a subway there would not be so much facility for discovering a leakage as there is now in a street?—I mean most distinctly to say that there is not.

3333. *Chairman.*] What I understand Mr. Bateman to say is, that one would be very expensive, and the other would be no expense; is that what you mean?—That is what I mean; one would cost money, and the other nothing.

3334. Mr. *Wilkinson.*] Supposing a leakage discovered in a subway, which would be the most costly?—Most likely the one in the street. It might be necessary to take a pipe out of such a size, and to intermix that with such other pipes that you could hardly get at it in a subway.

3335. Probably the leakage would be discovered before it had gone to so great an extent in the subway?—I cannot tell; it depends upon the amount of perambulation in the subway. Supposing a pipe bursts it would no doubt be very much more expensive to repair a burst pipe in a subway which is occupied with many pipes than it would to repair that pipe in a street.

3336. Did you observe the large pipes that are laid in the subways as at present existing?—There are no large pipes in the subways.

3337. Did you observe the pipes, whether large or small?—I did.

3338. Possibly I am wrongly informed, but I am told that large pipes have been laid down within these last few days?—I am not aware of that.

3339. You have not been in the subway since the pipes charged with water and gas have been introduced into it?—There were no large pipes in the subway when I accompanied the Committee.

3340. You have not been there since you accompanied the Committee?—No, I have not.

Re-examined by Mr. *Toulmin Smith.*

3341. You said that your experience lay chiefly in Glasgow and Manchester?—Oh, dear no; I have supplied I think not less than 40 different towns with water.

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3342. Both these large towns of which you have given us a description are in Glasgow and Manchester?—Manchester and Glasgow are the largest towns which are supplied.

3343. Is it not necessary that the measures taken for the supply of water in places like Manchester and Glasgow should be of the same character as those for the supply of the large districts in London?—They are measures which are specially alluded to in the instance of those two towns.

3344. Therefore although your experience may not actually have been on the spot in London, your experience is precisely the same as regards London?—Precisely.

3345. You told us that two tunnels which you made for some works which you constructed were for the purpose of carrying pipes through them?—Yes, I have mentioned two in Glasgow, but I could have mentioned many others.

3346. So that you have had actual experience of the laying of pipes in what is equivalent to subways?—I have.

3347. What room do you consider to be necessary round each of the pipes in order to have proper space both for laying and inspection?—It would be very difficult to make a lead joint with less than 15 inches round a pipe.

3348. Does that mean round the joints?—A clear space all round the joints.

3349. Was it upon that calculation that you made the two tunnels that you speak of?—Yes; I am not positive that that is the precise dimension. A man has to get down with his shoulders free, so as to enable him to work, to caulk up the lead. It requires a considerable space to do that.

3350. Some questions were asked by my learned friend as to the safety of these things. Will you explain what sort of safety you meant; whether you spoke of the safety of laying the pipes, or do you refer to one sort of pipe, whether gas or water pipe?—The question asked by Mr. Denison I understood to apply to the condition of the pipe. The safety of the pipe was never alluded to as laid in the vault. But it was as laid in the street, that is what I understood Mr. Denison's question to apply to, and I answered that I considered one as safe as the other.

3351. That answer applies to the pipe itself, and not to the use of it?—To the pipe itself.

3352. Is your experience that in consequence of the leakage of gas, and the difficulty of access to these pipes, it might be unsafe for the public that the pipes should be so placed?—I think it is unsafe to lay a gas pipe in a subway of that character, and that a gas pipe laid in a subway of that character would be certain to leak, and the escape of gas would render it, in my opinion, unsafe.

3353. So that as regards a public question it is not a safe measure to adopt?—No, if gas pipes are introduced.

3354. We have heard a good deal about vaults and valves; there are valves used by all the water companies of London, are there not?—Yes.

3355. Although they do not happen to have adopted the character of valve which you adopt, still they use a valve; the only difference is in the character of the valve?—I have adopted a great improvement in large valves; but in London the valves remain as they were 100 years ago.

3356. Is it desirable that companies of enterprise should be stopped from employing improvements from whatever source they come, whether Glasgow or Manchester?—No, I think every encouragement should be given to improvements in all the material works for the comfort and benefit of a town.

3357. Do I understand that it is a physical impossibility that these vaults and valves which you recommend, and have tried, should be put inside a subway?—As the subways are designed they would have to be enlarged, and special arrangements made for their introduction, and in many cases, if these subways come to be too largely occupied, I believe it would be impossible in practice.

3358. Is it an impossible thing that these vaults and valves should be put on one side of a subway?—It would involve inconvenience, and it could not always be done. The pipes must be inside; you could not take them through pipes; and there are hundreds of objections which might be raised in practice.

3359. My learned friend suggested, as a mode of getting over this, a clause by which they undertake to renew the subways if that were wanted?—

Mr. *Wilkinson.*] Perhaps I had better read the clause; it is this; "It shall be the duty of the Board from time to time to enlarge any subways, so as

as to afford sufficient space for the accommodation of all pipes which, under the provision of this Act, would or might be laid therein."

Mr. *Toulmin Smith.*] You are aware, I suppose, that the very plausible pretext on which this Bill is put is, it will prevent inconvenience to the public; do you think the public would be prevented from being inconvenienced, if they opened a great subway, in order to enlarge it in the streets?—*Answer.* That is a question of degree.

3360. Do you think the public would be as much inconvenienced by the opening of pipes in the streets under the present system, as they would by opening the streets to enlarge a subway?—It is far better to lay a 36-inch pipe by the side of the street than to enlarge the subway.

3361. You are aware that, with the exception of the New River Company and the East London Water Company, that all their London supply comes from the western part of London?—Yes.

3362. Is it not therefore a necessary consequence, apart from any wish or will of the separate companies, that the pipes of more than one company must go through several streets at the same time?—I am aware it all comes from one source, namely, the Thames to the west of London, but there are so many streets which are main arteries through which the different companies may carry their pipes, that I do not think it is necessary for each company, or each city of 400,000 persons, as I have endeavoured to illustrate it, to be supplied all along one system, but each division of the metropolis would probably have to carry its pipes for enlargement along the same street.

3363. Did you hear Mr. Simpson's evidence?—Only part of it.

3364. Did you hear him state that the Chelsea Waterworks, for the convenience of supplying their customers, had two pipes in the same street, the one for filtered, and the other for unfiltered water?—I did not hear that, but I know many cases in which there are four or five distinct pipes in the same street; one pipe supplying District A.; another pipe being laid in the same street to supply District B., beyond that; then, again, another pipe for the supply of District C., beyond that; and, again, another pipe for the supply of District D., beyond that. They are all carried along collaterally in the same street.

3365. Is it not necessary that a water engineer should have some special knowledge of the way in which gas affects the water or the earth through which water pipes are laid?—Gas affects the earth through which water pipes are laid by penetrating it.

3366. To that subject you have paid attention?—I am obliged to do so.

3367. So that as far as gas contaminates water, you have made it a special object of study?—To that extent.

3368. It would be likely to be drawn in, if there was a fracture in the gas pipe so as to contaminate the water?—Yes.

3369. In the use of a pipe, does the cement expand and contract the pipe?—No.

3370. Is that the reason why it can only be used in a smaller class of pipe?—Yes, it is used partly in consequence of that, in the smaller class of pipe, and partly from the expense; when you go up to a large size, then the expense of turning and boring the pipe is greater than the expense of a lead joint.

3371. In the case of cement, is it not the fact that the pipe and the socket are ground exactly like the top of a decanter, and then fitted in?—Yes; roman cement is used, and in all the pipes that I have had, I have a preparation for making that joint good, in case of a break. In all pipes I have cement joints; I have a preparation made for running it up with lead, and making good afterwards in case of a fracture.

3372. So that, in point of fact, if you use in these subways larger pipes than 36 inches, you must use lead?—According to the present system in laying pipes, that would be the general practice. There are some pipes of larger dimensions than that made with cement joints, but not all.

3373. We have heard of ventilation. Do I not understand you to say that the numerous openings in these subways do not give ventilation unless there is a steady current secured?—They do not.

3374. A steady current is a thing that is necessary both to keep the air sweet, and to drive out the gas?—There must be a current in one direction to drive out the foul air, and to bring in the fresh air.

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3375. You said there would be contamination of the water-pipes, if the water-pipe was empty, from the gas?—Yes.

3376. Will that occur equally in the subway as in the present system?—I think it would if the air in the subway became contaminated with the gas.

3377. With regard to this subway of two-thirds of a mile in Southwark-street, is it your opinion that one furnace would be sufficient if there were two shafts to ventilate the whole?—I think that is a matter of experiment; two-thirds of a mile is a great length. In mining we take care that there is no division of the current, and we have one continuous draught, perhaps for a mile, but then we admit cold air down a down shaft, as it is called, and the foul air we draw out by means of a furnace.

3378. Viscount *Grey de Wilton.*] I suppose the furnace, if it existed, would be useless if they did not close up those apertures in the roof?—Possibly so; they would have to provide for the introduction of fresh air; I do not think it would be useless, because it would drive in at every one of those openings.

3379. It would not interfere with the action of the furnace?—No.

3380. *Chairman.*] In a coal-mine you put your furnace under the shaft?—Sometimes at the bottom of the shaft, and sometimes at the top of the shaft.

3381. It is always in the shaft, either at the bottom or the top?—Always in connexion with the shaft; I do not think these various openings would interfere with the draught; perhaps if you had plenty of air admitted these openings would be of advantage because they will admit the fresh air.

3382. There are small water pipes in Covent Garden?—Yes.

3383. Do you know how those valves were put there?—There were no valves, at least I do not know whether there were any valves or not; I saw none there; the only things I saw connected with the surface of the street were the fire-plugs or hydrants; valves are required for every branch and every street.

3384. Mr. *Wilkinson.*] Have you any idea how much room the valves now used in London take up?—I should say two or three times the diameter of the pipes.

3385. Mr. *Powell.*] Are the valves above the roadway?—Not generally; the small valves are mostly buried in the street. The point of the spindle which works the screw upon which the disc of the valve rises is brought within a short distance of the surface. You see the plug-box where the turncock puts his key down.

3386. *Chairman.*] But with regard to any difficulty about the water, that might be obviated by having your openings into the sewer?—Then you get the foul air from the sewers.

3387. Do not people go into the sewer now?—Yes; the large sewers are tolerably well ventilated, because there is a strong current of water, and air is carried down with the current. I have been over my knees in water in sewers myself. The atmosphere is not pleasant, but I have not been killed. Supposing you have an opening in the subways, and from the subway into the sewer, the whole atmosphere of the houses would be spoilt, because they would be in direct connexion with the sewer; in fact, the houses would be the ventilators of the sewers.

3388. But there would be the traps?—The traps would be of no use for discharging any water which would accumulate by leakage or breakage.

3389. Mr. *Floyer.*] Were there no valves in the Covent Garden subway?—No; air valves are introduced at the bends of pipes to discharge air. Various kinds of fire-cocks are used. The fire-cock which is generally used now over a large portion of the kingdom, is a ball valve which drops when there is no water, and rises when the water rises. Whenever the ball drops the water is always low. The supply of water in London is what is called intermittent. There is not so much danger of contamination when the supply is constant and the pipes always full. In London, as the system is an intermittent supply, therefore, there is more danger of contamination here than elsewhere.

3390. There is no necessity for these air valves in that length of water piping in the Covent Garden subway?—None.

3391. Did you not say that they were required at short distances?—No stop cocks are required at short distances; air valves are only required where there are

are bends; they are not generally introduced in small pipes, because drawing off the water from small pipes draws away the air; but in large pipes you have to introduce mechanical apparatus for the discharge of air, which comes in at the bends; air valves only require it on summits. If a ball valve is introduced as a ball cock, they are placed on the average every 100 yards; that will admit air into the pipe.

3392. *Chairman.*] With regard to Southwark-street, do you suppose that that subway would be quite sufficient for the supply of the streets?—Quite.

3393. Both water and gas?—I should think both.

3394. Mr. *Powell.*] Do you put service pipes into your large 36-inch pipes at Glasgow?—Yes; according to the system which I adopt, I call every pipe down to six inches in diameter a main pipe. I do not allow the houses alongside to be supplied direct from that pipe, therefore, whenever there is a pipe of six inches or larger diameter, whether as a separate pipe in the centre of the street, or on both sides of the street, for the purpose of supplying the houses, which I call a distributing pipe, and then the service pipes are those which supply the houses.

3395. Then from your 36 inches there is no direct communication to the houses?—No; nor would there be from any pipe down to six inches; at five inches I begin to supply the houses.

3396. *Chairman.*] Is that the case in London?—I should think it is; I do not allow any pipe of six inches, or larger sizes, to be used for the supply of the inhabitants.

3397. Mr. *Powell.*] If you take a given sectional area, is there a great difference in expense when you divide that between two pipes instead of having it all in one pipe?—Yes, according to the square of the diameter; the square of the diameter, if you take a pipe of two feet in diameter as compared with four feet in diameter, is 16 feet.

3398. Is there a greater expense when you give the same sectional area for two pipes instead of giving it for one pipe?—Yes; you have two pipes, as I will show; if you take a pipe of two feet diameter, you want to have two pipes of an equivalent sectional area; the area of a two-foot pipe is three square feet; you must have two 18-inch pipes, as nearly as possible, to give you the same area as one 24-inch pipe; therefore, you have nine feet run in one case against six feet run in the other, which is 50 per cent. more.

3399. Then you have a thinner pipe, probably?—A trifle thinner, but not in that proportion.

3400. I presume that the valves which you employed in the Glasgow Water Works, were not designed for a small space, and you did not desire to cause them to occupy a small space?—They are designed for the smallest space they could occupy with efficiency; it is desirable to make all these things in as small a space as possible.

3401. Supposing you had to design a valve, the great object being to make that valve work in a small space, you would not despair of producing a valve to work efficiently in a smaller space than your Glasgow valves?—No; I must have rather more than three times the diameter of the pipe to introduce a valve of that kind. Large valves are very expensive things, and those valves are so arranged that I can get to the screw or round the screw, or lubricate it without disturbing the valve. I must have space to get round it, in order to lubricate it.

3402. Have you any system of ventilating the vaults, wherein these valves are?—In all cases in which we apprehend danger, we introduce a candle first to see whether the air is inflammable.

3403. Do you attribute the escape of water which takes place generally, to the bursting of the pipes, or some fracture of the joint?—Generally to the bursting of pipes; that occurs also from leaky joints. It depends very much on the system of water-supply introduced. When the pipes are frequently emptied and refilled at every refilling, you probably have a number of blown joints, particularly where they are laid on a level. The large pipes laid on a level, as the water falls, flops up and down, and hits such hard blows that it bends the joints, therefore, whenever the pipes are fresh emptied, there is great danger of blown joints.

3404. Are the failures of valves frequent?—Not very frequent.

3405. Viscount *Grey de Wilton.*] The tunnel of 440 yards at Glasgow, which you stated was 10 feet by 7 feet, was driven for the accommodation of two pipes?—Two pipes only.

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3406. There would be no room for any more?—No.

3407. Of course you build it in the smallest size you can?—Yes.

3408. Mr. *Powell.*] Can you give me any idea as to the increase in the cost of having two pipes instead of one?—It depends on the size of the pipe. If you take two pipes equivalent for one, it would cost from 20 to 30 per cent. more in the weight of iron, besides the additional cost of laying.

[The Witness withdrew.

Mr. *James Muir*, sworn; Examined by Mr. *Toulmin Smith.*

Mr. *James Muir.*

3409. ARE you the Resident Chief Engineer of the New River Water Company?—I am.

3410. How long have you been in the service of that company?—For rather more than 30 years.

3411. Are you thoroughly familiar with its supply?—Quite.

3412. I believe the New River Water Company is by far the largest water company in the metropolis?—It is.

3413. Can you inform the Committee what is the population of the district supplied by the New River Water Company?—We supply now 112,000 houses, but I suppose that would represent a population of about 800,000.

3414. That is the population you actually supply?—Yes.

3415. Can you inform us how many miles of streets there are within the metropolis occupied by your mains?—Three hundred and twenty-two within the metropolis.

3416. Is that the number of miles of streets actually occupied by your pipes?—By our pipes.

3417. Can you now inform us what the number of miles is in which only one line of your pipes is laid down?—One hundred and eighty-nine.

3418. How many miles are there in which there are two lines of your pipes?—Eighty-seven.

3419. How many miles in which there are more than two lines of your pipes?—Forty-six.

3420. What is the total mileage of the pipes of your company?—Five hundred and ninety-eight, including the district outside the metropolis; 571 in the district within the metropolis.

3421. Can you give us any estimate of the cost of that mileage of pipe?—Yes; I have very carefully estimated it, and I believe that it may be put fairly at 600,000 *l.*, the cost of the pipes alone.

3422. The actual cost of the pipes now laying in the streets?—I may explain that they have cost the company more, but they could be laid now for that.

3423. Have you considered the proposition in this Bill?—I have.

3424. Should you be disposed to recommend your company to adopt the subway, if you found it useful and safe?—Yes, certainly.

3425. Have you found it necessary, in connexion with your work, as a water engineer, to consider the effect of gas upon water?—Yes.

3426. And the effect of gas, as laid down in the streets of London?—Yes.

3427. Do you think that it would be safe to lay gas and water pipes in one subway?—I think not.

3428. Let us take the case of gas. In what respect would that be objectionable, in your opinion, speaking as a water engineer?—The great objection is the liability to explosion, and of course the destruction of the water pipes, with everything else around.

3429. Have you paid attention to the subject of the leakage of gas pipes?—I have.

3430. Have you satisfied yourself that that is a matter which can be brought under control by ordinary care?—I think not.

3431. Do you find, from your extensive observation, that the fact of leakage taking place, as a rule, is inherent in the system?—It is.

3432. Do you think that if the gas pipes, speaking of them now alone, were laid safely in the subway, that they would be less liable to leakage, and consequent danger, than they now are?—I think, to some extent, they would.

3433. But

3433. But would the leakage cease?—No.

3434. Will you state to the Committee some reasons why it would not cease?—I believe that leakages will occur in consequence of unavoidable defects in the pipes themselves. Leakages will certainly occur from the gradual corrosion of the wrought iron service pipes. I believe that is now a source of the great leakage which takes place in the London streets.

3435. Service pipes are always of wrought iron?—Yes; the main pipes being cast iron.

3436. Is there any source of derangement likely to arise from the service of the houses?—Leakage does occur.

3437. What would be the effect upon your water pipes if an explosion took place in a subway?—They would be broken; necessarily broken.

3438. Do you think that the water pipes would be laid in the subway as easily as they now are?—They cannot.

3439. What are your reasons for thinking that they cannot?—One reason is, that they would cost more. The experience already had in that small case of Covent Garden shows me that the laying of pipes in a subway will cost 22*l.* per cent. more than laying pipes in the ordinary manner.

3440. It is your company which has laid down that pipe in the Covent Garden Subway?—Yes.

3441. Mr. *Powell.*] Will you state the size of the pipe?—It is only a 6-inch pipe.

3442. Mr. *Toulmin Smith.*] Yes: the result of that has not been satisfactory?—It has not.

3443. It has cost 22 *l.* per cent. more?—Yes; I will explain how that is. The pipe, there, is laid in the simplest way. We refrained from using all that we would, under other circumstances, have used in that place, because the difference in the actnal cost was 15 *l.* per cent. more than it would have cost in the ordinary way. When we had to make a communication with an adjoining pipe, the cost would have been raised to 22 *l.* per cent. above what the ordinary cost is.

3444. Why did you avoid making that communication?—To avoid expense.

3445. In cases where it is necessary to have a communication with neighbouring streets, it is necessary to have a double bend?—Yes.

3446. Would that necessitate, in the case of every other street, new jointing?—In all other streets.

3447. That would both produce friction, and be more expensive in working?—Certainly.

3448. Was it any wish of your own that you laid your pipes in this subway?—No; the New River Directors were very unwilling to lay this pipe in the subway. They had some difficulty in ascertaining to whom the jurisdiction over the subway belonged. Ultimately, they were informed that the parish vestry had the management of the subway. To them they applied, and the answer from the vestry was to the effect that they desired, exceedingly, that the pipe should be laid in the subway; and the Directors were very unwilling to stand in the way of what was represented to be an experiment for the public good. They represented the difficulties of the case, and the pipes were laid down chiefly on this account: that the gas company had preceded us about a year before they had laid their pipes down, and, therefore, had brought all the risks to the place already; so that, whether the pipe was laid in the subway or on the ground above, the risk of explosion was there.

3449. How long has that pipe been laid?—That was laid in the end of 1862.

3450. Having tried the experiment in the subway, you do not think that it is a desirable thing?—Certainly not; the cost being greater, and the risk great.

3451. Water pipes are liable to burst sometimes, are they not?—They are.

3452. Can you always foresee the cause or, after the event has happened, judge of the cause of bursting?—Not always.

3453. As a matter of fact, within your New River district, have not pipes burst several times within the last few yew years?—They have.

3454. In cases of bursting taking place in a subway, would the consequence be so easily dealt with, and a defect remedied, as above-ground?—They would not show themselves, and they would require inspection to be discovered.

3455. Would it be easy to inspect these subways when full of water?—No.

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3456. No amount of inspection would enable you to foresee, or prevent the possibility of, a water pipe bursting?—No.

3457. While above-ground they still burst?—Yes.

3458. What is the effect of the concussion upon the inside of the pipes?—A very frequent cause of the bursting of the pipes is the charging of the water, which is a considerable weight. The force of the pressure above acts like a ram on the pipe, with enormous force, tending to split it. That is a thing to which pipes are always subject, whether in subways or out of subways.

3459. Is it not the fact that pipes are not quite equal in their mode of casting?—No, they are not; hidden flaws are frequent causes of pipes bursting.

3460. If a pipe is laid in the ground, and the earth well rammed round, is it so liable to burst, as it is without any ramming at all in the open subway?—I do not think that the earth will protect a pipe, or give it greater strength. I think it would in some degree mitigate the leakage from a gas pipe, but not from a water pipe.

3461. What would be the effect on the neighbouring houses in the case of the bursting of a pipe in a subway?—If a large main burst in a subway, the first consequence would be the stopping up of those small trap-gullies by means of which there is a communication with the sewer; it would send the water from the subway into the side passages; and if there is any communication, as has been proposed, from these side passages into the vaults, the water would pass into the houses.

3462. Have you considered the question of damages and compensation: do you think you ought to bear that, or these gentlemen who are partners with yourselves in this subway?—No; that is one of the first points which we wished to have settled before entering the subways. The question we wanted to have answered was, Upon whom was this damage to fall, either from gas explosion or water leakage?

3463. With your experience of large works, with reference to which questions of compensation must sometimes arise, do you think any equitable system can be devised as to who is to pay for damages?—I think not; it would be so difficult to trace the accident to its source, so as to find out who is responsible.

3464. You are of course familiar with the practical mode of executing works; do you consider that inside a subway, by means of artificial light, the workmen will do the work as thoroughly, and as well, as in the open air?—I think not.

3465. Have you had, in the course of your experience, opportunities of judging of underground work?—I believe, in this very case of Covent Garden, one of the causes of the increased expenditure was the unwillingness of the men to remain below for any length of time; as our foreman described it, they were always coming to the surface to blow.

3466. And that was the case of a subway which had not the houses on each side?—Only a few.

3467. Did you pay them higher wages?—I did not.

3468. Is artificial light itself a means likely to produce as good work as daylight?—No.

3469. Looking at the liability of which you have spoken, do both the gas and water companies consider it safe to be applied, generally, to the streets which are about to be made of the length of Southwark-street?—I think not.

3470. Do you think that access for workmen can be as easily obtained for repairs and for inspection of the pipes in the subway?—The inspection of a small subway like Covent Garden, where there are only three little pipes, might be managed well enough, but in a thoroughfare where there are leading mains it would be a difficult matter.

3471. Is it not usual to speak of two distinct classes of mains, one of which is generally called the through main, and the other the supply main?—That is so.

3472. The service pipes are connected with the supply main, and after with the other main?—With the smaller main.

3473. Is not Southwark-street a street in which you must contemplate what mains must be long?—It is not a district I have studied, but I should think so.

3474. Take Cannon-street?—It is certain that there will be a through main along Cannon-street.

3475. Viscount *Grey de Wilton.*] Is that within your district?—Yes.

3476. Mr. *Toulmin Smith.*] How much room do you think there ought to be around

around each pipe, in order to have proper facility for laying and careful inspection continuously?—Where we can get it I have always prescribed 18 inches, without reference to this inquiry.

3477. Do you think it would be safe to rely upon a less pipe than that, in order to afford a sufficient supply?—For the larger main you ought to have 18 inches.

3478. You have lately laid a new main in Gray's Inn-lane?—We have.

3479. What is the size of the main you took up?—They varied; they were two small mains, for which we have substituted one of 16 inches. I may explain, with regard to that driving, as it is called, in Gray's Inn-lane and the neighbourhood. I suppose there has been no such disturbance for 50 years; it is quite an exceptional case.

3480. When you lay down new works of that sort, is it your practice to keep the whole street open for a length of time, or do you do a certain number of yards at a time?—We do it in sections, according as the traffic can be turned into the side streets.

3481. Can you inform the Committee how long any one stoppage took place in a street?—Seven or eight days; I should think that was the most.

3482. In the case of the repair of a subway, would it not be of very much greater importance that the inspection should be close, and the repairs kept up more effectually than it is above ground?—Certainly.

3483. Have you a plan showing the state in which the Covent Garden Subway would be if the pipes were continued as in any other of your districts?—I have the plan which was presented to the Committee a day or two ago, showing the Covent Garden Subway with the pipes which are now in Cheapside, merely to show how insufficient that subway would be (*producing the same*).

3484. Does that represent the pipes actually existing?—These are the pipes that exist in Cheapside. The purpose of this drawing is merely to show the insufficiency of the accommodation which that subway would afford to Cheapside; a very much larger subway would be wanted in Cheapside.

3485. *Chairman.*] You have your pipes in Cheapside?—Yes.

3486. Mr. *Toulmin Smith.*] You are aware that the new street, which they have got an Act of Parliament for making from the Mansion House, will cut across many of your pipes?—It will.

3487. You will have to make junctions in some way or other?—Certainly.

3488. Will it be possible to keep up the regular current or flow of your supply without having recourse to these rapid bends in the pipes?—There must be several bends; but in regard to that street, I may remark that, from its position between two leading lines of thoroughfare, Cheapside and Thames-street, it will be a less difficult matter for the New River Company to deal with than it would have been had it been more apart from the other thoroughfares.

3489. Suppose the gas pipes were removed out of the subway, do you consider that then the subway would be safe from danger arising from gas?—Not altogether; because in sewers, as we know already, gas gets, and would probably get into subways.

3490. The facts are notorious as to the accumulation of gas in sewers, I believe?—That is quite proved.

3491. There is the case of several men being killed, which has been already before the Committee?—Yes.

3492. Do you consider that any saving would occur to the company in the annual expense of pipes being laid in the subway?—I think not.

3493. You can give some figures as to the cost of laying a pipe in a subway, and the cost of laying a pipe of the same size for the same distance out of a subway?—The actual cost, taken from the contractors' bills, of laying in Covent Garden Subway, and adding to that the cost of the pipe, was 65 *l.* 1 *s.* 1 *d*; that included everything connected with providing the pipe and laying it in Covent Garden Subway. An equal length of pipe laid in the ordinary way, and taken at the ordinary contractors' prices, would have cost 51 *l.* 4 *s.* I have some additions to make for screw-cocks and plug-boxes, bringing the whole estimate up to 56 *l.* 7 *s.* 9 *d.*

3494. Have you to make that addition to the price outside or the price inside?—In either case we required the cock, and that appears in both cases; these are items on both sides of the account, so that you may take the expense as 65 *l.* 1 *s.* 1 *d.* on one side, and the expense of laying pipes in the ordinary way as 65 *l.* 7 *s.* 9 *d.*, making

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making the cost of laying pipes in the subway rather more than 15 per cent. above the cost of the ordinary system.

3495. Mr. *Powell.*] Do you include the permanent repair of the roadway?—In the one system I do, but not in the other.

3496. Viscount *Grey de Wilton.*] You include the compensation which you pay to the parish for paving?——

3497. Mr. *Toulmin Smith.*] Your figures are not an estimate, but actual facts?—One is a fact, but the other an estimate from the contractors' prices.

3498. So that they are, practically speaking, both of the same strength?—Quite so.

3499. In the case of the pipe in the subway at Covent Garden, is there any fire-plug?—There is one.

3500. Do you find any difficulty in managing that?—It added to the expense of raising the pipe with a cock or hydrant at the top.

3501. That, of course, comes out of the subway into the street?—It passes through the roof of the subway into the street.

3502. Is that a more costly work to do than a fire-plug is in the street?—It is.

3503. Is it necessarily so?—Necessarily.

3504. Is it possible that any device could be invented by which fire-plugs could be otherwise arranged than by bringing them to the surface of the street?—No; because it is on the surface that the water is wanted.

3505. Is it necessary that you should have access from the surface of the street to the pipe?—It is; there must be the means of connecting the cock with the pipe below.

3506. Will all those be more expensive when you have a pipe laid in the subway than when you have a pipe laid in the open street, as now?—They will.

3507. Can you give the figures, showing the cost of an 18-inch and a 20-inch pipe?—The purpose of the Committee will be most shortly answered by taking an estimate which I have. It is as to a smaller-sized pipe, and if this is true as regards a smaller-sized pipe, it will, of course, be of more force with regard to a pipe of larger dimensions. I have taken an average size of seven inches only, to be on the safe side. I find that the first expense which they would have to incur as an extra expense from laying the pipe in a subway would be making connections with the side streets. Suppose I have a four-inch connection and a six-inch connection to make at intervals, I am at a greater expense of 2 *s.* 6 *d.* per yard run of the main. The next expense I encounter is the adaptation of plugs to the subway, and for serving those hydrants to which I have referred. I put that at 9 *d.* per yard run; that is to provide a plug, or what is equivalent to it, in the subway.

3508. *Chairman.*] That is extra?—These are all extra.

3509. Mr. *Toulmin Smith.*] Beyond the expense to which you are now put?—These are all extras. I have taken also an addition for emptying cocks, which will be quite necessary, and the air-escape valves, which I put at 6 *d.* per yard run for the two. The next item is providing supports for the pipe. If they recommend it, I still prefer having the pipes buried; but if supports are to be used, they will add very considerably to the expense, making it 3 *s.* 6 *d.* per yard run, if we are to have two supports for a pipe, which will be needful, taking the estimate given on other side at 5 *s.* each support. Then there is an item for artificial light of 1 *d.* per yard run. There will certainly be extra labour in getting tools and material down into the subway, and getting the ground out of the subway, which will have all to be carried by baskets; that is put down at a penny per yard. There will be some hindrance from insufficient space. The extra expense amounts to 7 *s.* 5 *d.* per yard run in laying a seven-inch main.

3510. You have not charged anything for inspection?—Nothing yet; I have supposed the inspection, after the main is laid, to be an annual expense. Our present contract price, including everything, for laying a seven-inch main would be 9 *s.* 5 ½ *d.* If you dispense with supports, it would reduce the expense very considerably; that would bring the additional expense to 22 per cent. upon the cost of laying the pipe in this subway over what would be the cost of laying it in the ordinary way. That gives, without the least intention, the actual experience of Covent Garden.

3511. You gave those figures to the Committee as the result of an experience of 20 years in the management of the laying of these pipes?—Yes.

3512. You are quite confident that that is the amount of extra expense which would have to be incurred?—Undoubtedly.

3513. Then will you tell us the expense of inspection afterwards?—I have put that under a separate head.

3514. *Chairman.*] Is it estimate?—This is necessarily estimate. We have no account by which I can separate any expenses; the fact is, the experience is so very short that very little can be drawn from the 100 yards which we have in Covent Garden.

3515. Mr. *Toulmin Smith.*] Have you any other items?—This is an estimate.

3516. What are the items which are included in that?—I will only give the heads.

3517. *Chairman.*] Whether it is 100 yards or 500 yards makes all the difference?—In the total expenses?

3518. In the rate of inspection?—Yes.

3519. Mr. *Toulmin Smith.*] The figures you have before given have been the rateable expenses of so much per yard run?—They have.

3520. The cost of inspection would necessarily have increased according as the subway is longer, I presume?—Undoubtedly.

3521. *Chairman.*] The cost of inspection would decrease per yard, according to the length of the subway, would it not?—It would, according to the length; but for a very small length like this, you can hardly give the fraction of a man's time: 100 yards is so small that you could not estimate it; if you have a very great length, it will become a serious item. My difficulty is to say what amount of inspection is necessary for Covent Garden.

3522. How often does the inspector inspect Covent Garden?—Time is quite insufficient. New pipes certainly do not need frequent inspection; it is after the pipes have been down 15 or 20 years, when decay has taken place, that inspection will be required daily, if not more frequently.

3523. Mr. *Toulmin Smith.*] Another item of expense is the house service: will the expense of the house service remain the same, or be lessened or increased, by the use of the subways for mains?—Very slightly lessened; in all probability, if the street is adapted for it, the old pipe may be laid almost at the same cost as the new. If we are permitted to have them on each side of the subway, they might last much longer than they do at present; and then there will be a little saving in excavation, which is a saving that the householder will have the benefit of.

3524. You are then calculating upon having an opportunity of laying one of your service mains in the street?—I am speaking now of laying a service main in each corner of a wide subway.

3525. Will that be in addition to your general main?—We always have that in addition to the general main.

3526. Do you not put your service mains upon two sides of the street?—We do.

3527. Will it not be necessary for your service mains to the houses to be longer than they now are?—To some extent it will. I was putting against that increased length of pipe the saving there would be to the householder in excavating the ground to receive it.

3528. You have given us the actual figures of the cost of a yard of service pipe; do you pay that, or the tenant?—The tenant, in every case.

3529. It is just as important to him as to you to have it done cheaply?—Yes; the general cost of the lead is from 6 *d.* to 9 *d.* per foot for the service pipes.

3530. Then it is matter of calculation, according to the length of the service pipe, as to any loss from depredations occurring in the subway?—I think an entrance to the subway an easy matter. There are so many men belonging to the gas, water, and telegraph companies, that it would be very easy for any of them who are dishonest to take away any amount of lead pipe without its being known who the thief was.

3531. There are very ingenious methods adopted for stealing lead?—It is a very simple way: they merely take a hammer and beat up the pipe, so as to prevent the escape of water into the house, and carry it off.

3532. So that every increase in risk of that would be an increase of risk to the tenants of losing their water supply?—Yes.

3533. Upon the most careful consideration that you can give, do you see any

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advantage to the water companies in the subway which would counterbalance the numerous disadvantages as well as the danger which you have spoken of?—No, I do not; the advantages are but small in comparison with the disadvantages. I was going to read the heads of saving. The companies would save in these particulars: they would save in the payment for paving, and in the excavation of the ground; they would save, probably, to some small extent in the number of leakages. I am not limiting that to pipes laid in the bottom of the subway, where the loss is liable to be the greatest, and where the pipe goes immediately under the concrete of the paving. I also allow a saving, although a slight one, for cock packing. The spindle of the cock is so near the surface of the ground, that the sand from the ground is very apt to run into it when packing; I have estimated that at something, although it does not amount to very much. The paving I can give you actually from past experience, at the average price paid by the company for paving; the annual amount, per mile of street, is 5*l.* 6*s.* 8*d.* for the repairs that they made upon their pipes.

3534. Is that through the whole of your mileage?—The whole of the metropolis.

3535. Is that your company?—The New River Company.

3536. *Chairman.*] Is that estimate for a double pipe as well as for a single one?—Yes, per mile per annum.

3537. Mr. *Toulmin Smith.*] Does that include compensation to the parish?—It includes everything.

3538. Would you get rid of all the necessity for openings in the streets?—Certainly not; all the plugs would require still to be on the surface, and require renewal of the pavement round them.

3539. Then the whole of the 5*l.* 6*s.* 8*d.* must not be regarded as saving?—I have separated that, because I have put it down in another estimate. These are the heads of the savings, and the heads of the extra annual outlay to which the company will be subjected, by laying the pipe in the subway. There will be some extra expense for maintaining a new fire-supply apparatus; and an extra expense for inspection; and an extra expense for artificial light; and an extra expense in getting the materials for iron pipes; and repairs down into the subway; and making the repairs in the subway. Those are the heads of the extra annual expenses.

3540. Comparing the two together, what is the general result?—As carefully as I can make the estimate, I find the loss to be between 12*l.* and 13*l.* per mile, allowing for the savings; and I think the estimate is a very moderate one.

3541. Have you in that reckoned the extra expense to which you will be put as to cock and plug boxes?—No; I suppose the expenses connected with the cock and plug boxes to continue.

3542. Mr. Simpson gave it, in evidence, that there would be additional expense incurred in these two respects?—Not additional expense in connexion with the boxes, but with the fire-supplying apparatus.

3543. Perhaps you will make that out in another form, so that it can be put upon the Notes?—I will.

3544. *Chairman.*] The extra expense is not per annum?—Yes.

3545. Viscount *Grey de Wilton.*] That is quite exclusive of the original laying down?—Quite.

3546. Mr. *Toulmin Smith.*] This brings us to the number of openings which are made in the streets: can you give the Committee some definite information as to what proportion of the 3,400 openings can, in any way or shape, inconvenience the public?—I do not at all object to the number of openings returned. I am ready to admit that they rather understate the number; but the average size of the openings, in the course of the year, I find to be 2¾ square yards.

3547. That is the average, taking the whole 3,400?—Yes.

3548. There have been a few more than they have returned?—Yes.

3549. How long do those openings appear upon the surface?—Some of them only an hour or two.

3550. Is it not your practice to give careful notice beforehand to the parish authorities?—We always give notice where we have any new work; and where an emergency has arisen, when there must be instant attention paid, there is always an account given to the parish of what we have done.

3551. You always send them a report, so that they have the precise facts before them at all times?—Yes.

3552. I believe

3552. I believe under the Waterworks Act you are allowed to remedy emergencies without previous notice?—Certainly.

3553. But in no other case can that take place?—No.

3554. From your observation with regard to the various works carried on in London, do you think the public inconvenience would be saved by the water companies being obliged to go into the subways, upon the condition of the subways being enlarged at some future time?—I think not. I have already said, with regard to the driving in Gray's Inn-lane, that that is a thing which had not occurred for many many years; and probably, had there been a subway in the first instance, instead of laying a line of new pipe there would have been an enlargement of the subway.

3555. Would it be possible with that enlargement of the subway to make improvements in laying the pipes?—It must have taken a much longer time.

3556. Did you hear Mr. Bazalgette's evidence, about the proposal to have a 35-feet span arch in the new street for the railway and the pneumatic despatch, and the rest?—Yes.

3557. Do you think those would work well with gas and water pipes?—I do not see how we could carry a main across a railway so as to supply the other side.

3558. On the other hand, with regard to the practical question of vibration, do you think that there would be vibration to a pipe carried alongside a railway?—Very great.

3559. Have you ever thought of the question of frost?—Yes.

3560. Do you think your pipes would be liable to frost if the subway was properly ventilated?—If the pipes are not buried they would be liable to frost in subways.

3561. You are aware that the proposal is not to bury them, but to put them down in a subway?—Quite so.

3562. If you bury them you have only the inconvenience of the earthwork all over again?—Just the same.

3563. And the public inconvenienced just the same as where you have to bring out the earth?—The earth, in all probability, would be laid on one side.

3564. Yes; but the earthwork must be extracted?—In laying the pipes for the first time.

3565. You are now speaking of a repair like that in Gray's Inn-lane?—In the case of a repair in a subway, I do not think the inconvenience would be more than in the other way.

3566. The space in the subway would gradually get smaller and smaller as the pipes were laid down?—If it was cramped in space you would lose the advantage of inspection, and between the advantage of inspection and the disadvantage of having them exposed you must choose.

3567. What would be the effect of an accident taking place upon a railway under the same cover as the gas and water-pipes?—If a train left the line so as to come on the gas and water pipes, of course they would be broken to pieces.

3568. Having considered the subject in all points of view, both with reference to the advantages and the disadvantages, is it your opinion that the advantage to the public counterbalances the disadvantages to the water companies?—I think not; because, although the object aimed at is a desirable one, the advantages are so few, and the expenses so great, that the public in the end would be the losers by the scheme.

Cross-examined by Mr. *Wilkinson.*

3569. Admitting the *primâ facie* advantage to the public, you still think that the disadvantages more than counterbalance that advantage?—I think so.

3570. Do I gather rightly that your chief objection is to the expense incurred by the companies?—No; my chief objection is the risk.

3571. Let me understand: which is, in your experienced mind, the greater evil and danger, the increased risk, or the increased cost to the companies?—I think, in a public point of view, the increased risk is a very much more serious risk than the increased expenditure which can be brought upon the companies.

3572. Which of those two do you think the greater?—The risk.

3573. We are to understand that the risk is the principal objection, and not the cost?—Yes.

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3574. Now, directing your attention to the risk, I understand you to say that that is occasioned principally by, and indeed the only point you have given us as to risk is, the danger of explosion?—And also the risks connected with the bursting of a water main in a subway, for those will not be inconsiderable.

3575. The risk of the bursting of a water main in the subway would not be greater than the risk of the bursting of a water main on the surface?—I think the consequences would be more serious.

3576. Are you aware of the connexion between the water pipes in the subway and the sewer running under the subway?—By means of a trapped gully, I am.

3577. You have been frequently through the King-street Sewer?—Yes.

3578. Have you been also in the Southwark-street Subway?—I have not.

3579. Bearing in mind the connexion and frequent intervals between the subway and the sewer underneath by means of these trapped gullies, do you think that there would be then any risk from a sudden volume of water, which I presume is the difference between the danger in the subway and the danger on the surface; would not that be sufficient to counterbalance the disadvantages?—I am quite sure that the result of a heavy amount of leakage would be that the gravel would be washed into the traps, which would be choked, and no more water would be passed into the sewer, and the water would then rise into the side passages of the houses.

3580. Do you think that the facility of inspection would completely obviate such a result?—All this would occur in a quarter of an hour.

3581. Am I to understand then that, in your judgment, that is a serious risk?—I think it is a risk which might easily occur.

3582. Notwithstanding the facility of constant inspection, which of course will exist in a subway, which does not exist when the pipes are bored under the surface of the street?—Accidents might readily happen by reason of the inspector not making a proper inspection.

3583. Then with regard to the explosion, I understand that you consider leakage to be inherent to a system of gas pipes?—I think you can never say that you are absolutely free from the risk of leakage.

3584. Do you think that that danger of leakage would be decreased or not materially lessened by having the means of constant access to every pipe?—I think I have admitted that pipes if properly placed in a subway would be less liable to leak.

3585. Those are the only heads of danger which you have suggested, namely, of explosion, and the possibility of the mains bursting and accumulating water in a subway which would not relate to the surface?—And the risk of theft.

3586. You are aware that these subways are protected by gratings?—Yes.

3587. Do you think the risk of theft would be greater by a system so administered than under the present system?—The entrance to a subway, even though there are cast-iron doors, is a very easy matter, and would not at all baffle a London thief; an entrance could be effected by a bent rod or wire inserted to open the grating. Men belonging to the companies themselves are not always honest, and it is not an uncommon thing for them to steal the lead, and they would have an opportunity in the subway without detection of taking great quantities of lead away.

3588. Do you suffer under the present system from that?—To some small extent we do.

3589. Do you think that most of that was occasioned by the servants of your company, or by strangers?—We know of that being done by our own servants.

3590. *Chairman.*] To what extent?—Two, within the last six months.

3591. Mr. *Powell.*] On a large scale?—I do not know what amount of lead was carried away. I may explain that the lead is not the property of the company. That is not a theft for which the company suffers, but the public.

3592. Mr. *Wilkinson.*] It is the particular occupier of the house who suffers when the lead is stolen?—Yes.

3593. *Chairman.*] Let us have the fact as to what happens in the Covent Garden Subway at present?——

3594. Mr. *Wilkinson.*] I presume the King-street Subway has not afforded you any experience?—It has not as yet.

3595. *Chairman.*] Then it turns out that lead is not stolen in the subway?—No.

3596. Mr.

3596. Mr. *Wilkinson.*] Upon the question of leakage, what at present do you consider is the average loss from leakage?—I have no means of ascertaining what number of gallons of water passes away in leakage; it is not a great amount, because the leakage is immediately discovered. That is not so with gas; with water almost as soon as a leakage occurs it appears on the surface, and is stopped.

3597. At present it is an accidental passenger, who first reports and makes it known to one of the officers of the company?—Yes.

3598. Do you suppose that the loss by leakage would be at all affected?—The loss suffered now by leakage, and the value of the water that passes away is so small that it would matter nothing to the company.

3599. Would that loss be at all increased to make it a matter of any moment?—No, I do not place much stress upon that.

3600. Now one word as to the cost, you were good enough to state that you will prepare tables, which we can examine with a little more care than we can do now?—Yes, I have prepared a table, and I have read the heads of that table. The amounts in every case I did not mention, because they are merely estimates.

3601. Will you undertake to let us have that table to-morrow morning in a state, so that it may be put upon the notes?—Yes.

3602. I understand you to say that your actual experience of King-street shows an increase of 22 per cent. in the expenses of laying the pipes?—Not quite. The work actually done was 15 per cent. more, but if we had carried out the work of connecting the pipes in continuation with one of the mains, that would have made 22 per cent.

3603. The actual cost was 15 per cent; but if you had made the connexion which you thought desirable, that would have involved an increase of 22 per cent.?—Quite so.

3604. You, of course, made a connexion with your pipes outside the street?—We did.

3605. In what way was that made?—By bends.

3606. By what you call a double bend?—Yes.

3607. Is that an expensive operation?—It costs more.

3608. What is about the cost of that double bend?—Bends in castings are more expensive than straight pipes.

3609. Can you give me the difference between a bend and a straight pipe?—It would probably cost double.

3610. I suppose the cost of that double bend you have divided upon the length of the street?—I have.

3611. Do you know the length of a street pipe?—The whole length is 128 yards.

3612. Suppose, instead of 128 yards it was 1,280, with only one double bend for a junction, that would have reduced your per-centage very considerably?—There would not have been one double bend in a straight length; there would have been a number of side connexions.

3613. Directing your attention to the single item of the double bend pipe, would you put that as double the cost?—Not the whole cost.

3614. Can you give me at all the amount of the increase of cost occasioned by the double bend pipe?—I cannot say what the double bend pipe would be, but the bent portion of the pipe would probably cost twice as much as it would if it had been straight.

3615. That divided by a length of only 180 yards would of course increase the total cost considerably more than if separated into a length of 2,000 yards?—It would not add so much, as the bent part of the pipe is not of great length.

3616. How do you generally employ your men; do you pay them so much per day, or piece-work, or how?—Generally so much a yard, by contract.

3617. Upon this occasion, did you employ them by day-work or piece-work?—Day-work.

3618. How much a day did you give them?—Four shillings.

3619. Perhaps that is one of the details which you will supply us with. Do you find much difference in the amount of work done when you pay them by the day or by the piece?—Yes, generally speaking, there is a difference, but to prevent the difference being considerable, there is a foreman appointed to look after the work to see that they loose no time.

3620. I think you told my learned friend that one of the causes of the addi-

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tional expense was the fact that these workmen came up from the subway, as you expressed it, "to blow"?—Yes.

3621. That they did in spite of inspection?—The inspector from feelings of humanity did not prevent their going to do so because the air was most stifling, and to compel the men to remain 10 hours below would have been a cruel thing.

3622. Do you mean really to say that that was occasioned by foul air?—And the fierce fire for making the joints. I was down there myself, and found it so stifling that I should not have liked to have remained an hour. There were fires for melting the lead to make the joints with.

3623. What kind of fire?—An ordinary fire they use in the streets, an open fire.

3624. You consider the fire was really sufficient to account for their anxiety to come to the surface to blow?—Quite.

3625. That was the only excuse they made; was there nothing else beyond the fire?—Nothing.

3626. It was only one fire which they used for the purpose of their work?—Yes.

3627. Mr. *Powell.*] What was the fire made of?—It was a coal fire.

3628. Not coke?—No; coal and coke.

3629. Mr. *Wilkinson.*] Was it of the same description of fire as those which you use on the surface?—Yes.

3630. You say you had an inspector to superintend?—Yes.

3631. Did you give them plenty of beer below?—I do not think there was any greater allowance of beer on the occasion. It was really a necessity for fresh air.

3632. And not for fresh drink?—No.

3633. You think so?—Yes.

3634. Mr. *Powell.*] Were you present at the time?—I was down the subway during the driving. I was not present during the time that the men were said to have come up.

3635. Mr. *Wilkinson.*] You have said that the men used a common fire to joint these pipes?—Yes.

3636. Are you in the habit of using any other artificial light besides the common fire?—The fire is for making the joints.

3637. Are you in the habit of using any artificial light?—No; we generally try to do it in daylight.

3638. You have not found it necessary to use any of the safety lamps?—No.

3639. Are you aware of the invention of Mr. Upward?—Yes.

3640. You have seen that?—Yes.

3641. Supposing your men had used this invention in the subway, the necessity of going to the surface would have been avoided?—His invention, as I understand, is for tapping gas mains.

3642. Would it not be available for jointing water pipes?—No.

3643. Do you think it would be difficult to suggest any kind of light which would be free from the escape of the noxious gases in the subway?—It was not from any light, but the actual fire that the man suffered so much; the heat.

3644. Would it not be practicable to obviate that danger by the substitution of some other mode of lighting than the common fire which you now use?—The fire is not used for the purpose of lighting, but for the purpose of melting the lead.

3645. Do you use the cement joints at all?—No.

3646. Have you ever seen them used?—I have not seen them used; and they could not in certain cases be used. The great object of their using joints in London is, that they do not admit of any deflection of the pipe. They are perfectly rigid pipes, and there can be no deflection of one pipe from another.

3647. You think it will not be possible to supply this double bend pipe at the point of junction?—No.

3648. Why not?—Because of that rigidity in the joint of which I spoke.

3649. I think you stated that you preferred having the pipes still underneath the earth and not upon the surface?—Yes.

3650. Do you consider that they would be equally free from the disturbance of vibration if laid in that way?—I think so.

3651. One question with regard to the new subway proposed by the continuation of the Thames Embankment-street; you showed a drawing, which I should be obliged if you would let me look at it again. This, as I understand you, contains

contains the pipes which are at present laid down in Cheapside, deposited in the subway, which would be carried under this new street; is that so?—The subway now in Covent Garden.

3652. Of the size as at present existing in Covent Garden?—Quite so.

3653. Are you aware that the size of the subway which is proposed to be carried under the new street has not been settled at all?—I am aware of that now.

3654-5. Therefore, it would be competent to increase it to a much larger size than the size of the subway under Covent Garden?—That drawing had no reference to the new street; it merely shows that such a subway as exists in Covent Garden would not be sufficient for Cheapside.

3656. Is this suggested as the most convenient way of arranging the pipes in a subway?—Certainly not; it is just to show the inconvenience of the whole thing.

3657. Do I understand you to say that it was necessary to have a space of 18 inches round the pipe for the purpose of inspection?—Not necessary, but very desirable.

3658. Will you tell me in actual practice what you do find sufficient?—There must be sufficient room for a man to get round the pipe. When the pipe is large there must be space enough for the man's body to go round.

3659. Would not that space be more readily obtained in a subway where you have no earth to remove?—You cannot get the space if you have a large pipe to remove. There is no difficulty in removing the earth, but we are speaking of two pipes lying close together.

3660. What is the minimum of space which in practice you think to be sufficient?—Enough to allow a man to get round the pipe. If it is a small pipe nine inches might do; but if it is a larger pipe a foot might do. It is not advisable to have less with a larger pipe.

3661. *Chairman.*] By a small pipe, you mean a pipe of 12 inches?—Six or seven inches.

3662. You say 12 inches would be sufficient for a large pipe?—Say a 12-inch pipe: you ought to have 18 inches for a larger pipe of 24 inches or 30 inches or 36 inches.

3663. Mr. *Wilkinson.*] Am I to understand that from 12 inches up to 24 inches a space of 12 inches is sufficient?—You might allow 12 inches up to 24 inches.

3664. Beyond that you think 18 inches is sufficient?—Yes.

3665. I understand you to give the total cost of laying the pipes in Covent Garden as 65*l.* 1*s.* 1*d.*?—I did.

3666. Are you going to give us the details of that?—I can.

3667. I should be very glad if you will hand those details in with the others to-morrow morning?—I will do so.

3668. There are two water pipes laid in that subway, are there not?—One.

3669. One water pipe only laid by you and two gas pipes?—Yes.

3670. Are you aware that by the provisions of the Bill now under the consideration of the Committee this question of expense is a question to be referred to arbitration?—I believe so.

3671. So that if it be as you have stated, instead of a saving to the Companies there would be a considerable increase in the cost to the Companies, even admitting that fact they would simply go to the question of the payment to be made by you or the payment not to be made by you for the use of these subways?—Or the payment to be made to the Company for their losses.

3672. At any rate so far as the amount to be paid by you is concerned that simply would be an ingredient in the arbitration and nothing more?—That is so.

3673. Were you in the room when Mr. Bateman gave his evidence?—I was.

3674. Did you hear him allude to the large valves which I had in Glasgow?—I did.

3675. Have you any of those in use?—Not that particular description of valve, but large valves are always required for 36-inch pipes.

3676. What is the largest pipe you have in use?—The valves or screw cock for a 36-inch main would require a space of 6 inches in width and 8 feet in height; you may take that as about the size.

3677. Name the place, and then give me the size?—I say a 36-inch cock.

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3678. Where have you that?—We have many, wherever we have a 36-inch main.

3679. Will you name one?—We have several in the neighbourhood of the New River Head and at Stoke Newington.

3680. I want one in a public thoroughfare?—St. John's-street-road.

3681. Give us the size of that; whereabouts is it in the St. John-street-road?—Near the top of St. John-street-road.

3682. What do you mean by the top?—The north end, towards Islington.

3683. Is that the only one in the street?—In that street.

3684. That street runs from Smithfield towards the Angel, does it not?—Yes.

3685. How far is the Angel from that?—One hundred yards.

3686. If I remember right, there is the Euston-road, Goswell-street, John-street, the City-road, and High-street, Islington?—They all meet there.

3687. There is a very large open space there, is there not?—There is; all 36-inch valves or cocks are of the same size.

3688. About what size chamber do you require?—The cock itself is four feet six inches in width, and eight feet in height; that is stated roughly; I do not pretend to give you the exact measurement.

3689. Where is that placed now?—It is buried in the road.

3690. In the centre of the road?—Yes; where the main happens to lie.

3691. Mr. *Powell.*] How deep is the pipe at that point?—The pipe is probably four feet deep; there is four feet of ground to the top of the pipe.

3692. Mr. *Wilkinson.*] That would be 12 feet?—There is the diameter of the pipe, and there is the thickness of the metal, then there are the flanges beyond that, and then the door or valve which is raised up; it must have a chamber to pass into; that door is necessarily larger than the main which is covered by it; that chamber must be at least three feet six inches high; then there is a plate on the top of the cock, and the stuffing box, on which the spindle of the cock must pass; all that is in the roadway.

3693. I think your estimate of eight feet can be hardly accurate; if that be the depth, would you not bring it above the surface of the road?—There would be fully four feet of ground on the top of the pipe; there is the pipe and the cock goes below the pipe, and rises above the pipe.

3694. What amount of depth of paving is there?—Only a few inches of paving above the spindle of the cock.

3695. That, you say, you have never ascertained actually?—I can give you the accurate dimensions, but I have not got them with me.

3696. Perhaps you will give us those actual dimensions?—I will.

3697. Would there be the least difficulty in placing the valve in the necessary chamber in a subway?—Not if the subway were large enough.

3698. In a subway adapted for that street?—I think it only shows the necessity of making the subway large enough.

3699. Are you aware that there is an obligation on the part of the Metropolitan Board of Works to enlarge the subway as the exigencies of the case require?—I am told so.

3700. Is that in your judgment satisfactory?—That depends on who are to be the judges of the sufficiency of the size of the subway.

3701. I suppose I may take it that one item in your greater cost for work done in a subway, as compared with work done on the surface, is the necessity of paying by the day, and not by contract?—Paying higher wages to the men.

3702. And you also have a difficulty in paying them by piece-work?—I think if subways come to be general we should be able to get from the contractors prices; but as they are new things, the contractors have declined to give prices per yard-run, and therefore we are driven to do it by piece-work.

3703. Then that difficulty is only temporary?—Yes; but it must be understood that the addition which I made to the payment of the men did not arise from their being engaged by the day, but from their demand of higher wages, in consequence of their being made to work underground.

3704. Do you ever suffer any inconvenience by reason of interruption to the work from the weather?—Never, if it is a thing that presses.

3705. In the ordinary course of your work, is not that so?—If it is such a thing as the laying down of a new pipe in which the delay of a few hours does not matter, the men knock off in bad weather.

3706. They knock off in very inclement weather in the winter?—Never for anything that presses.

3707. Do you mean to say that there are no dangers of bad work or inconvenience arising from bad weather?—If there is a repair being made the men will never knock off in consequence of bad weather.

3708. You say they never knock off, even under stress of weather, where the repairs are pressing?—Quite so.

3709. But surely those repairs must be done under much more disadvantageous circumstances than if done in a subway which is protected from the weather?—They are not done in so much comfort, but they are done in good light.

3710. Is not protection from the weather something?—Not in the way in which it is done.

3711. Is there not a greater facility for inspection and supervision?—No; the inspecting foreman is there wet or dry, and he can see as well in the rain as in the fine weather.

3712. You do not mean for one moment to compare the work done with the protection of a subway, and the facility of inspection afforded with the exposure of the whole of the pipe and the presence of the inspector, with the work done upon the surface with the most inclement weather in a storm of hail or snow?—I say that the subway will give protection to the men no doubt, but it will not ensure good work.

3713. Will it not ensure a greater security of the work being done in a more efficient mode?—I think to a very small extent, if done at all; and the occurrence is so very rare a one that it is hardly worth considering.

3714. Do you attach any value at all to the fact that there will be no interruption to their work from the weather?—Very little.

3715. Then you will be good enough to give us the details for which we have asked you to-morrow?—I will do so.

Re-examined by Mr. *Toulmin Smith.*

3716. You were asked about these gratings or traps in the subway—I believe they are what are called traps, and are the only means of communication between the subway and the sewer below it?—They are.

3717. They are more liable to be choked up when there is a great body of gravel flung down?—Most certainly.

3718. Supposing the water was to make its escape through this house drain, would it not have a tendency to burst the pipe?—I think not.

3719. *Chairman.*] Perhaps you had better consider a little before you abide by that answer. You say there are no means of communication except those traps?—Between the subway and the sewer.

3720. Are you quite certain you are correct?—There are none in Covent Garden.

3721. Mr. *Toulmin Smith.*] With regard to the facility of inspection, does that give a perfect assurance to the water companies or the public against danger from the bursting of pipes?—I think not.

3722. Do not those burstings of pipes invariably happen without any notice whatever?—Without any notice.

3723. Do you not find from past experience with respect to the works of the New River Company, as a fact, that pipes do oftentimes burst?—Yes.

3724. And that no amount of previous inspection will secure you from that?—They burst with no sign of it beforehand.

3725. On the other hand, will not the results of either the explosion of a gas pipe or the bursting of a water pipe inside these subways be much more disastrous to the public than the result of a water main in the street?—It seems so to me.

3726. It is an increase of the danger, which is the great point to be looked at?—Yes; the great advantage of the present system is this: that if an accident happens to a gas or water main, it is detected on the spot. In the case of a water main, it shows itself immediately. In the case of a subway, there may be a leakage from a gas main immediately after the inspector has gone round, and the inspector may not be at that spot for two or three hours, and if there were only an escape of gas in that Covent Garden Subway, of something like a cubic

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foot of gas a minute, you would require a draught through the ventilating shaft, through a circle of 12 inches, at a rate of something like 10 miles an hour.

3727. Supposing that there was a leakage of a water main in the subway, there would be no means of knowing it until the inspector went round?—No.

3728. Are there any lead pipes laid down from your pipe in this Covent Garden Subway?—There are.

3729. How long has that been done?—Some only a month or two.

3730. It is not any particular part of your duty to watch those lead pipes?—No.

3731. Do they not belong to the occupiers?—Yes.

3732. Are these water pipes less liable to leak in a subway than they now are?—I admit that to some extent the pipes will not be so much started as they now are; but the great leakages generally occur from the ram that takes place. A frequent cause of leakage is the change of atmosphere.

3733. If these pipes are laid upon brick arches or iron chairs, will there not be an absolute liability of the pipes being disturbed more than if they were buried in the ground?—They might; I think the unyielding surface of the chair a less proper way of laying the pipe than by burying in the ground.

3734. You are aware that that is the plan proposed?—I think so.

3735. The theory of this Bill gives no idea of the pipes being placed in the ground underneath the subways?—One objection to having a pipe above ground is the utter impossibility, if the subway is full of pipes, of moving amongst these pipes so as to carry in materials for repair, or getting out the broken pieces.

3736. We have been told that the work in Covent Garden Subway was day-work, and not piece-work. Are you in the habit of doing piece-work?—Yes.

3737. That was not an extraordinary thing at all?—Not at all.

3738. There are occasions in which you find the day-work works well, under the control of your inspectors?—Yes: we appoint an inspector where there is day-work.

3739. So that you adopt this system in certain places, and find it work satisfactorily?—Yes.

3740. Notwithstanding that in this particular case the result was a heavier cost to you?—It was.

3741. I think you also said, as to these men coming up to have a blow, that you were down in the subway during this operation, and you found the air stifling yourself?—It was very stifling.

3742. So that instead of the comfortable place which my friend describes it, for the protection of the workmen, it is in fact a stifling place?—Quite so. If discomfort is the cause of bad work, I am sure we may expect it in the subways.

3743. All this took place from one fire?—One fire.

3744. If you were in a subway a quarter of a mile long, you would be obliged to have more than one fire?—The work would advance, and as the work advanced, one fire would suffice. If there were repairs to two pipes going on, then two fires would be needed.

3745. Would it not be worse the further you got from the entrance?—It would.

3746. Do you consider where it would be necessary to use one of these safety lamps, that men would be very apt to go?—No, the safety lamps would suggest danger to them; it is an admission of danger where they proposed to use safety lamps.

3747. Did you think the proposal to use safety lamps helps to float this Bill?—I think quite the reverse; it is an admission that there is great risk in connexion with the subways.

3748. What do you think of the diving-bell plan?—I think that is an admission of risk likewise

3749. Speaking of the size necessary to get round a pipe, you alluded to a small pipe?—I alluded to a pipe of six or seven inches.

3750. Taking the greater number of the pipes employed by the New River Company in the streets of London, is that the average size?—I think the average, taking all the small pipes, is between seven and eight inches.

3751. I mean of mains?—Decidedly not; they would be from 12 to 13 inches.

3752. Speaking practically, you must not deal with what would enable you to get

get round these small pipes; but with what enables you to get round a 12-inch pipe?—No; if those are to be in leading thoroughfares, those thoroughfares would be the places in which these pipes would lie.

3753. If you had Southwark-street in your district, would you not require a main of 12 inches?—I should think so. I certainly should not have a less main than 12 inches in New Cannon-street.

3754. We have heard a great deal about the knocking-off of the men from bad weather; are you in the habit of laying pipes in the winter time?—No.

3755. You do not choose bad weather?—No.

3756. So that, in point of fact, you do not consider the advantage of the protection to the men afforded by the subway?—No.

3757. While there is a great disadvantage from the choking atmosphere?—Yes.

3758. Mr. *Wilkinson.*] Perhaps the Committee will allow me to put this question; what is the aggregate amount of the area openings from the subway into the sewer in 1,000 yards in Covent Garden?—I think the gratings are only something like eight inches square.

3759. You do not know how many there are?—No.

3760. In 1,000 yards, would not the area of communication between the subway and the sewer be sufficient to prevent the danger of flooding?—

Chairman.] That must depend upon the area of the pipes.

The *Witness.*] Not only that, it depends upon the traps remaining free; they are sure to be choked, and after the traps get choked, the water rises in the subway.

Examined by the *Committee.*

3761. Have you had a large fracture, within your experience, in 12 months?—Yes.

3762. I mean of large mains, I do not mean leakage. I mean when the whole of the water comes out, and the fracture of the pipe is so large that the water comes out of the hole instead of going along the pipe?—Very likely hundreds occur in a year where the pipe is broken; while it is in connexion with the reservoir, the pipes do not become empty, the water is shut off.

3763. I mean that the pipe continues to be empty if there is such a fracture?—Very often the pipe beyond is also charged. The water is made to come in a circle, so that a broken pipe is very soon supplied.

3764. How are they broken?—A change of temperature is one of the chief causes.

3765. Do you think that there would be much change of temperature in a subway?—With good ventilation there must be.

3766. How often have you stop-cocks?—We have something like 5,000 stop-cocks in 590 miles of pipe.

3767. Taking Covent Garden as a sample, if a pipe breaks there, is there a stop-cock near Covent Garden by which you can turn the water off at once?—There is one placed outside the subway.

3768. Supposing that was out of doors, if there was a grating to the sewer, do you think that that might be opened if there was a great quantity in the subway?—Yes; means might be found to open it.

3769. Immediate information would be given to the houses that all the water was running away?—If there was a communication in the Covent Garden case, there is a communication between those side passages and the vaults of the houses.

3770. But in the day time there would be none?—There would be none.

3771. With regard to the ventilation, what is your practical experience since the pipes have been down?—In Covent Garden there is very little ventilation indeed. The gas pipes are now in good order. When I was down there last, about six weeks ago, there was no taint of gas in the air, but the ventilation was not good, as is manifest from this: the fumes from the sewer which were meant to be carried up a 12-inch pipe from the top of the sewer into one of those ven-

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tilating openings, came down and found a vent into the subway so as to be quite disagreeable. There was very little motion in the air produced at all.

3772. It was not anything like sufficient to destroy life?—No; but sufficient to show that there was no ventilation.

3773. Merely a very bad smell?—Yes.

3774. Has there often been leakage of gas in Covent Garden?—No; I do not think there is time yet for leakage to manifest itself. The pipes have been down so short a time. Our pipes have only been down 18 months; the gas pipes were laid before.

3775. Yours were put down in 1862?—At the end of 1862.

3776. How often do you inspect the Covent Garden subway?—We have no regular time for inspection. Our men have been very often down. Our foreman is told to visit the place as often as he can.

3777. How often is that?—I should think upon the average, once a week.

3778. Has he a key of the traps?—Yes.

3779. And the gas people too?—Yes.

3780. Does the gas man go there as often?—I do not know.

3781. How was the lead stolen from your company's district?—Out of empty houses. I have mentioned that as a proof that we cannot trust our own men whom we are to have in the subway. They had a knowledge of the houses being empty. I mention it to show that our men who have a key of the subway cannot be trusted, and that the gas man cannot be trusted, nor can the telegraph company's men. As soon as it becomes known to those men that the pipes can be got away so easily, the lead pipes will be taken in great numbers.

3782. Viscount *Grey de Wilton.*] Which are the lead pipes?—The house service pipes.

3783. Which are the pipes which you mentioned as having been made of wrought iron?—The mains.

3784. Do you know why they make them of wrought iron instead of cast iron?—I presume on account of cheapness, or of the required thinness.

3785. *Chairman.*] How many men would go down a subway?—I suppose never fewer than two would go.

3786. If it is an inhabited house, do you think they would dare to take away the pipes?—They would not be seen in the subway by the people of the house.

3787. They would be immediately detected, because when the people of the house wanted water there would be none for them?—We should not know whether the water man, or the gas man, or the telegraph company's man, or some stranger had been down.

3788. You would know when your own man went down?—He would go down his own round.

3789. Does he not keep an account of when he does go down?—Yes; I dare say. He keeps no account of his going down to thieve.

3790. At any rate, it would be between you and the gas and the telegraph company?—Or a stranger, under pretence of being connected with the companies.

3791. Have you any maximum of dividend, by Act of Parliament, that you are not allowed to divide more?—I believe we have.

3792. Have you got up to your maximum yet?—Not to half the maximum.

3793. What is your maximum?—I believe 10 per cent. is the maximum of all companies.

3794. Mr. *Powell.*] Can you tell me what length of 36-inch pipe you have belonging to your company?—I cannot give it; I am afraid I have not the return with me.

3795. Will you give the return to-morrow morning of the length of a 36-inch main and the 2-feet main, belonging to your company, laid down in the streets of London?—Yes.

3796. *Chairman.*] With reference to that small explosion, the gas people attributed it a great deal to the sewer?—They did.

3797. Therefore we are liable to accidents under the present system?—We are, and a fracture of a pipe would make us liable to a very serious accident in the subway.

3798. Is not a straight street of advantage to you?—Yes.

3799. I mean

3799. I mean under the present system of laying pipes?—It depends on the line it takes; in some cases it is a great advantage; if it opens up a shorter course for a main we should think it an advantage. Mr. *James Muir.* 26 May 1864.

3800. You know Southwark-street?—I do.

3801. Should you consider it an advantage to the company which supplies it to take their mains through it?—I should think it would.

[Adjourned to To-morrow, at Twelve o'clock.

Veneris, 27° die Maii, 1864.

MEMBERS PRESENT:

Mr. Du Pré.	Mr. Powell.
Sir Baldwin Leighton, Bart.	Mr. Floyer.

SIR BALDWIN LEIGHTON, BART., IN THE CHAIR.

Mr. *Powell* stated that he desired to amend a question that he put yesterday as to the dimensions of the pipes belonging to the New River Company. He wished the question to stand thus, "What pipes have the New River Company giving dimensions above two feet?"

Mr. *Thomas Hersey*, sworn; Examined by Mr. *Richards*.

3802. ARE you the principal out-door Inspector of the Imperial Gas Works?—Yes. Mr. *T. Hersey.* 27 May 1864.

3803. Have you been so for a great many years?—Upwards of 10 years.

3804. Having been employed in the company in another capacity for many years before that?—For 10 years before that.

3805. The district of the Imperial Gas Company lies to the north of Oxford-street, extending for a considerable distance east and west, I believe?—Yes.

3806. Marylebone and St. Pancras?—Extending from Paddington to Bethnal Green, and all north of Oxford-street and Holborn.

3807. Are you the officer upon whom devolves the duty of superintending the laying of the company's mains?—Yes.

3808. And you have, I presume, other sub-inspectors under your orders?—Yes, 28.

3809. And the sub-inspectors, I presume, superintend the actual laying of a large portion of the mains, you going to look to the more important works?—Yes, that is so; but in addition to the inspectors, we have a foreman to each job, employed by the company as against the contractor.

3810. Do you continually overlook each individual job yourself from time to time?—Yes.

3811. About what extent of mains have you, for the last three or four years, annually superintended?—We have averaged 17¾ miles per annum.

3812. *Chairman.*] Have you laid 17¾ miles?—That is the average for the last three years.

3813. Mr. *Richards.*] The average for the last three years has been 17¾ miles, but last year you laid more?—Last year we laid nearly 20 miles.

3814. They were of various sizes, of course?—Yes.

3815. And all that was done under your immediate superintendence?—All of it.

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3816. I presume you are tolerably familiar with all the details of main laying?—Yes, I am.

3817. Have you examined the Southwark and Covent Garden subways?—I have.

3818. When you went to see the Covent Garden subway, were the pipes there exposed to view, or were they covered over?—They were covered over.

3819. Were they laid in the subway much in the same manner as they would be laid in the open street?—I suppose they would be, being under ground.

3820. In your judgment, is the gas pipe travelling under ground in the subway in Covent Garden, the slightest criterion of the effect of a gas pipe in a subway?—It is not parallel at all; it is as if it were laid in the street.

3821. Bringing to bear your experience of the number of gas and water pipes which are required in large thoroughfares, in your judgment is the Southwark-street subway one which would accommodate the pipes likely to be required in so great a thoroughfare as that?—No, I think not.

3822. It is not in your company's district?—No.

3823. Do you know the district about Southwark?—Yes, tolerably well.

3824. And knowing it tolerably well, do you adhere to the answer you gave just now?—Yes. It intersects three leading lines; it runs from east to west, and intersects three leading lines of road, consequently a thoroughfare like that ought to have large mains in it, to connect with the mains running north and south; it intersects the Southwark Bridge-road, runs up to Blackfriars Bridge-road and the Borough-road, crossing the Southwark Bridge-road; all those are principal thoroughfares, and should have large mains.

3825. Supposing such a subway to exist in some analogous situation in your own district, say High-street, Islington, should you consider it sufficient to accommodate the pipes running through that district?—No, I should not. I have some plans here that will show how the mains are situated.

3826. *Chairman.*] This is a new street you are speaking of; it may be a question whether the Board of Works, when they make a new street, are bound to make that street for the advantage, among other people, of these water companies, for them to take their pipes along. (*To the Witness.*) Do you know whether Southwark-street is at the end of a district or not?—I know it is not at the end of a district.

Mr. *Richards.*] It might be somewhat a matter of speculation.

Chairman.] I think the witness has said it is not at the end of a district.

Mr. *Richards.*] There lies a great deal beyond that.

Chairman.] If it is at the end of a district it does not require so much as if it is at the beginning of a district.

Mr. *Richards.*] That does not follow.

Chairman.] I should think the parts near the reservoir required larger mains than at the end of the district.

Mr. *Richards.*] But the pipes of other companies may be going through, too. In Regent-street, at the present moment, there are three pipes.

Chairman.] If Southwark-street is at the end of a district, it does not require so much as you would require about Parliament-street.

3827. Mr. *Richards.*] (To the *Witness.*) Do you know whether Southwark-street is or is not at the end of a district?—I believe it is not.

3828. *Chairman.*] Do you mean for gas or water?—For gas.

3829. Mr. *Richards.*] Do you know as to the water whether it is at the end of a district?—I do not.

Chairman.] What I wish particularly is, that the witnesses should state facts, because really many witnesses have stated their opinion, but on a little cross-examination we found they did not know the district.

Mr. *Richards.*] This evidence must be speculative. I asked the witness this: looking at the subway, and putting it in an analogous situation in his own district, would he say that it is sufficient to carry the pipes?

Chairman.]

Chairman.] You mean, whether it is sufficient to supply Covent Garden street; unless the witness knows where the pipes are required, to be laid, and the nature of the large district beyond, his evidence is worth nothing; and if a witness states something which turns out not to be correct, without at all meaning to say that he states it intentionally, it destroys his evidence completely in other respects; therefore, I really want you to ask the witness what he knows as a fact.

3830. Mr. *Richards.*] (To the *Witness.*) Does your experience tell you that Southwark-street, and streets of those dimensions, usually have only the pipes which are necessary for their own supply, or are they generally employed to accommodate leading mains going beyond?—Generally they have small mains for the supply of the houses in the street itself, and large pipes going through to other districts.

3831. Do you consider that the subway that you saw, assuming that there would be such an amount of pipes as generally exist in such a thoroughfare, would give accommodation enough for the purposes of the repairs of the pipes?—No, certainly not.

3832. If it is at the end of a district, you think it would be sufficient?—It depends upon the size of the pipes.

Mr. *Powell.*] You have forgotten the new clause, which imposes upon the Metropolitan Board the duty of making subways of a sufficient size.

Mr. *Richards.*] And altering them if they are afterwards called upon to do so.

Mr. *Powell.*] You know the clause as it stands.

Mr. *Richards.*] There is a peculiar absence of any provision for payment in that clause.

Chairman.] The witness's evidence goes for hardly anything. He says: "He considers." He does not know the facts.

Mr. *Richards.*] I do not know what we can do more than bring the evidence of a practical man to say what is his opinion of the thing as it stands. Mr. Hersey says, in an analogous situation like High-street, Islington, he is clearly of opinion it would not be sufficient.

3833. *Chairman.*] (To the *Witness.*) Do you know the district that is served near Covent Garden, and how far it extends, both as to water and gas?—Covent Garden, I do not know. I am speaking of Southwark-street.

3834. Can you tell us the district in Southwark-street?—I know pretty well the district; the Phœnix Company supply Southwark to Brixton and Clapham, and all that way, their works being a little south of Southwark-street.

3835. How far east do the Phœnix Company go?—As far east as the Borough-road.

3836. The Borough-road ends at Southwark-street, does it not?—Yes; but the leading line of their works would intersect Southwark-street, too.

3837. Mr. *Richards.*] It intersects three leading streets?—It intersects the Southwark Bridge-road and goes up to Blackfriars and Borough-road.

3838. We were told the cost of making the subway was 3*l.* 12*s.* 6*d.* per foot?—That was the last price I heard.

3839. It comes out to 19,140*l.* per mile?—It does.

3840. Can you give us the cost of laying the mains in the streets?—Yes.

3841. Take an 18-inch main, for instance; give us the cost of laying that as it is now in the streets; that is, of course, excluding the cost of the material, the iron, and so on; I want to know the cost of opening the trench, laying the pipe, and so on, per yard?—The cost of opening the ground, putting in the pipes, and filling in the ground again is 6*s.* 8*d.* per yard.

3842. That is for the 18-inch pipe?—Yes, 6*s.* 8*d.* per yard.

3843. That includes the jointing?—It includes everything; laying the pipe.

3844. *Chairman.*] Everything except the material?—Everything except the material.

3845. Mr. *Powell.*] Does it include the compensation for parishes?—It does not.

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3846. Mr. *Richards.*] What have you to add for the parishes making good the pavement?—That would vary according to the description of road; in the macadamized roads we should pay about 1*s.* a yard run; 1*s.* 3*d.* is the outside.

3847. And the granite-paved road, what would that be?—That would be, without concrete, 1*s.* a yard run.

3848. What would it be if it had concrete?—Two shillings per yard.

3849. Mr. *Powell.*] I do not understand the term "per yard run," because it must depend upon the width of the pipe?—I speak of an 18-inch pipe.

3850. Mr. *Richards.*] Give us the same with regard to a 12-inch pipe?—The price would be 3*s.* 6*d.* per yard.

3851. And the paving with macadam?—Somewhat less; from 9*d.* to 1*s.*

3852. What would be the paving without the concrete?—It would be the same; we cannot make less than a yard in the trench.

3853. Whether it is a 12 or 18-inch pipe, the space you open in the paving would be much the same?—Yes.

3854. Have you ascertained what the cost of breaking up and restoring the streets within your district has been for the past year?—Yes; I can state the cost of laying the average size mains during the three years past.

3855. What is that?—The cost of laying the whole of the mains which we have laid in the last 15 years is for 93,715 yards, 2*s.* 2*d.* per yard, including paving and everything that averages a 7-inch main.

3856. *Chairman.*] That does not include the material?—It does not include the pipes.

3857. Mr. *Richards.*] You say the average; what size pipes does that include?—It includes from 2-inch up to 24-inch pipes. Mr. Muir was asked for the size of the pipes of his company, and I thought it would be better to see what sized pipes we have in the Imperial Gas Company; it is from 8-inches up to 36 inches. In our district, up to December 1863, there was 46,612 yards of 8-inch pipe, 10,036 of 9-inch pipe, 5,632 of 10-inch pipe, 37,610 of 12-inch pipe, 40 yards of 14-inch pipe, 9,483 of 15-inch pipe, 1,810 of 16-inch pipe, 3,364 of 17-inch pipe, 7,880 of 18-inch pipe, 1,890 of 22-inch pipe, 13,012 of 24-inch pipe, 7,481 of 26-inch pipe, and 7,551 of 36-inch pipe; that is the largest size we go to, and the 36-inch pipe would occupy a space of 12 feet from end to end.

3858. That only gives mains of a certain size; you have various mains below that?—Yes.

3859. Can you give us the length of mains throughout your district?—Five hundred and sixty miles of mains.

3860. That includes all those you have named, and besides that, many others, 2 and 3-inch pipes?—It includes all sizes downwards; there are 400 miles of streets and roads.

3861. That is exclusive of service pipes?—Yes, the service pipes are estimated at nearly 290 miles more.

3862. *Chairman.*] Are these your pipes?—Yes.

3863. Mr. *Richards.*] A good deal has been said about the opening of the streets, and so on; can you tell us in some of the leading streets in your district, what has been the expense for the past year of breaking up and opening the streets?—Yes.

3864.] Take for instance the Portland-road, that runs parallel to Portland-place, in Marylebone; what was the total cost incurred in the past year in opening and repairing that street?—In the year 1863, the cost was 3 *l.* 5 *s.* 10 *d.*

3865. *Chairman.*] What is the length of Portland-road?—About three-quarters of a mile; in that street we have 18-inch, 10-inch, 8-inch, and 4-inch mains.

3866. Mr. *Richards.*] Now, take a great thoroughfare, say High-street, Camden Town; what did you say for that?—£. 3. 9 *s.* 9 *d.* for that year.

3867. Mr. *Powell.*] Are you including all compensation to the parishes?—This is the parish compensation; this is the amount paid for breaking up the roads in these parishes.

3868. Do I understand that this 3 *l.* 5 *s.* 10 *d.* you have mentioned is the sum you have paid to the parish, or does it include all the opening and repairing?—Only what we paid to the parish; and if you take that out at 1 *s.* per yard, it will represent the surface opened.

3869. It being macadam there?—Yes.

3870. Mr. *Powell.*] What is the length of High-street, Camden Town?—Half-a-mile.

3871. What is New Oxford-street?—That is a paved concreted road; that is 4 *l.* 10 *s.* 10 *d.*; that is about half-a-mile as well; the amount is rather higher than usual on account of the great illuminations last year.

3872. Mr. *Richards.*] Tottenham Court-road; what is that?—That is the most expensive kind of paving; including concrete at 2 *s.* per yard, we paid 5 *l.* 14 *s.* 4 *d.*, 1 *s.* for the paving, and 2 *s.* for the concrete; that is rather more than 3 *s.* 4 *d.* a mile; there we have six mains.

3873. *Chairman.*] What did you pay per yard?—Three shillings.

3874. Mr. *Powell.*] Can you give the dimensions of those mains?—Two 12-inch, one 6-inch, two 5-inch, and one 3-inch pipe.

3875. Mr. *Richards.*] The two 12-inch being the great leading mains?—Yes.

3876. Will you give us the average cost of the whole district for the last three years?—The average cost of repaving for all purposes over the whole company's district for the three years ending December 1863, was 4 *l.* 15 *s.* per mile per main.

3877. That includes openings of all sorts and descriptions?—Openings for new mains.

3878. Openings for new mains, and to lay on services for new customers, and openings of all sorts and descriptions?—Yes.

3879. *Chairman.*] Have you got the opening of the old mains; can you separate them in any way?—I think I can. We paid for repaving for all purposes, except new mains, in the three years, 5,660 *l.* 6 *s.* 11 *d.*

3880. That is for the three years?—That is the total for the three years.

3881. For paving, or for opening and paving?—We paid that to the parishes or local authorities. Shall I distinguish the paving for the new mains?

3882. Mr. *Richards.*] The Chairman's question was for the old mains?—If I give it you for the new mains, the deduction will be the old mains: the amount for the new mains is 1,294 *l.* 19 *s.* 10 *d.* for the three years.

3883. *Chairman.*] The 5,660 *l.* was for how many miles?—Five hundred and sixty miles of mains, and 290 miles of service pipes over the whole district; the average would be 533 miles for the three years or thereabouts; that is for the new mains.

3884. That was for new work entirely?—Where there were no works before.

3885. Mr. *Richards.*] It includes amongst them some very small openings indeed, does not it?—Very small indeed; I have brought a book to show the Committee the nature of the openings. If the opening be for a service pipe, they will call it three openings, supposing there be three descriptions of payment. If we open in the road there would be a little Macadam, then we cross the gutter, and there is a little granite, and if we cross the footpath there would be a little bit of York stone; there would be three entries for one opening.

3886. *Chairman.*] If the water company were to go at the same time as you do, that is another opening?—Yes.

3887. Although it is only one opening, if you and they work together in the same hole?—That very rarely occurs.

3888. Mr. *Richards.*] There you have the details of the several openings?—Yes; and we find that in some cases one place has two or three openings.

3889. Something has been said with reference to the hurried and careless way in which connections are made, have you a person to superintend all the connections and all the pipe-laying that takes place in your district?—We have several; we have always two, but generally three or four.

3890. You have the foreman of the labourers, and above him the sub-inspectors?—There is the inspector directly under me, and a foreman of the main-layers, who does nothing else; there are four men sometimes.

3891. I presume that that inspector will inspect one, or two, or three jobs on the same day?—If it is a large job he is confined entirely to one.

3892. Do you consider that by the mode in which your pipe is laid every possible precaution is taken to prevent leakage?—Yes; every pipe is tested at the works under a considerable head of water, under a force-pump, and if they are found to be leaky they are rejected. All the service pipes are tested by steam being passed through them, and while hot a coating of tar is put over them.

3893. Mr. *Powell.*] You used the words "considerable head of water"?—We specified 200 feet a head.

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3894. Mr. *Richards.*] Do you conceive that every possible precaution is taken in order to get good material in the first instance to prevent the leakage at the joints?—Our pipes, both cast iron and wrought iron, are got from the best makers; we pay a heavier than usual price for both.

3895. What is your opinion as to the liability to explosion if any escape of gas were to take place in the subways:—I think the liability to explosion would be very great.

3896. Was it in your district that the desperate explosion happened, which was described by Mr. Simpson, in Albany-street?—It was in the company's district. I had not then the superintendence of the mains. I was on the spot directly after the explosion in Holborn, and I saw the effects of it. That was a case where a 12-inch main exploded two or three years ago, when two men were killed and two considerably injured, and damage done to house property.

3897. *Chairman.*] Was the damage done more than the breaking of the windows?—Yes, I believe it burnt up the front of one of the houses. I know two men were killed and two were seriously injured; and the amount of gas that caused that explosion could not have been more than 15 cubic feet at the outside.

3898. Mr. *Richards.*] And yet that caused that tremendous explosion?—Yes.

3899. Fifteen cubic feet would escape in a short time from a small service pipe?—Yes, a quarter-inch pipe will pass 80 feet an hour at 5-10ths pressure.

3900. A quarter of an inch bore in diameter will pass 80 feet in an hour?—Yes.

3901. You probably will agree with those who have gone before you, that the chances of leakage will be diminished in the case of pipes laid in the subway?—I think it would.

3902. Do you think the danger from an explosion would be much increased?—I think the danger from explosion would be considerable indeed. I do not consider that the Imperial Company have suffered much from explosions during the last three years. We have laid upwards 12,000 service pipes, and we have made upwards of 14,000 connections, and all the connections have been made without any accident to our workmen.

3903. Do you conceive that the gas escaping at once into the open air is a protection and source of safety?—I think it is a great source of safety. With regard to the partial suffocation of the workmen, which is frequent in the open air, I do not see how we should recover them at all if they had any accidents in subways.

3904. *Chairman.*] You mean from the men fainting?—They do faint, and it is a long time before they recover. We are obliged to have three or four men to pull a man out of the trench, and take him up to the air, and give him stimulants to recover him.

3905. From your being engaged daily in the laying of mains, do you find that that occurs frequently or only occasionally?—It is comparatively frequent.

3906. You take every possible precaution to prevent it as far as you can?—Yes, we insert bladders and bags where we have an opportunity of doing so. We were cutting out a 26-inch main in Russell-square, two years ago, to put in a valve, we had India-rubber bags put in, and properly inflated, and while the men were at work the bag burst.

3907. Mr. *Powell.*] By the term India-rubber bag, you mean the bladder we heard of?—The bladder is confined to pipes of six inches diameter.

3908. Was the bladder we heard of India-rubber?—A bullock's bladder; the bladders are used up to six inches.

3909. Mr. *Richards.* Are they all India-rubber that are used now?—The India-rubber is not used for less than an 8-inch pipe.

3910. What was the consequence?—The consequence was not very serious, because we had taken precautions beforehand and we stopped up the main with a bag of earth as soon as possible; but if we had been in a subway we could not have stood it at all; the men would have fled as soon as they could from the subway. I doubt whether they could have got away.

3911. From being above ground you had earth close at hand which you were able to throw into the pipe and stop it up?—We were prepared with a bag of shavings to put in at first.

3912. What distance are you bound to lay your gas pipes from the water pipes?—Four feet by the Act of Parliament.

3913. In

3913. In the subway that you saw would that be possible?—Certainly not.

3914. *Chairman.*] Do you do it?—We do it whenever we can, but we cannot do it always; the streets are not wide enough for us to do it.

3915. Mr. *Richards.*] There are places where the width of the street will not allow it?—Yes.

3916. And where you have to cross a water pipe, the water pipe running north or south, and you going east or west, or *vice versâ* what do you do?—We cross at the shortest angle we can.

3917. You are allowed to cross at any distance provided you do it at the shortest angle you can?—Yes.

3918. Do you find that the Metropolitan Board of Works in any communications you had with them with reference to crossing the sewers seemed rather to be afraid of the leakage of your gas pipes?—Yes, very much so.

3919. Whenever you come near to any of their sewers do they take great precautions to provide against leakage in the gas pipes?—Yes, sometimes we have occasion to ask them to allow us to cut the brickwork from the sewer; we had occasion to do so in laying a 36-inch main a year or two ago in crossing the Fleet sewer. I wrote to Mr. Bazalgette to ask him for six inches of brickwork, leaving 10 inches between; he kindly consented to allow me to make the cutting, but coupled it with this condition—I will read the letter, "Your letter dated the 26th instant, applying on behalf of the Imperial Gas Light Company for permission to lay a 36-inch main in the brickwork of the Fleet sewer at the St. Pancras Old Road, by Elstree-street, has been submitted to this Board, and I am directed to inform you that they have granted the application."

3920. There not being space enough to lay the pipe higher in consequence of the surface of the road?—There was not headway, "on condition that the Company enclose so much of the gas main as comes in contact with the sewer in an iron covering half-an-inch thick, lined with one and half inches of hemp and tar packing; the work to be executed under the superintendence and to the satisfaction of the officers of the Board."

3921. That clearly indicates the great danger that Mr. Bazalgette entertains of the possible leakage from the gas pipes?—I think so; that was outside the sewer.

3922. I think you wish it to be understood that you consider Mr. Bazalgette's conduct always has been accommodating and courteous to the last degree?—Yes.

3923. That shows his sense of the danger that may arise from the escape of gas?—Yes, I think so.

3924. Having been familiar with the cost of laying the mains in the ordinary way in the streets, have you been able to form any opinion at all of the cost of laying them in the subway?—I think that small mains might be laid at about the same cost. I do not think there would be much more expense up to 5-inch or 6-inch pipes; but when you get to mains of 18 inches and upwards, I do not think it is practicable to lay gas mains there at all.

3925. *Chairman.*] You mean without an enormous expense?—You could not get them down the entrances at present.

3926. Mr. *Richards.*] You said the entrances might be made larger?—If they are made large enough we could do it.

3927. You do not think, as far as you can form an opinion, that the cost of laying the smaller mains would be greater in one than the other?—No.

3928. Do you consider that the expense would be greater in the larger mains?—Yes; I think laying the mains without the power of introducing any tackle, would be more troublesome and expensive than laying them in the streets, considering that in every case we should have to lay them from 150 to 200 yards under ground by hand labour.

3929. *Chairman.*] What sized pipe can two men carry readily?—Two men would carry a four-inch pipe tolerably well.

3930. Mr. *Richards.*] Two men could carry on the level one length of a four-inch pipe?—On the level they might carry a five-inch pipe.

3931. But not where the weight is thrown on the lower man?—No.

3932. *Chairman.*] What is the weight of a five-inch pipe?—Something under 200 weight, and five feet in length.

3933. Mr. *Richards.*] It has been suggested that it is a common thing to cement the pipes above the ground, and to let down the two pipes connected together,

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together, is that your habit?—No; it is sometimes done from having to cross a drain; for example, when it would be inconvenient to make the joint in the drain, the pipes are coupled together, and then used, but it is limited to pipes of three or four inches size; it is rarely done.

3934. But it is not your practice?—Certainly not.

3935. And it is only done where it is a great convenience, and with regard to the smaller pipes?—Just so.

Cross-examined by Mr. *Johnson.*

3936. I understand you to say that in your judgment the Southwark-street subway would not be adequate for the insertion of the various pipes required?—That is my opinion.

3937. Will you tell me what pipes you infer are necessary to be placed within that subway?—I need scarcely infer, because I take the plan shown by Mr. Innes, the gas company's engineer, and which the company agreed to, that they require an 18-inch and two 10-inch mains.

3938. You are inferring from the evidence given by Mr. Innes; you confirm him in the opinion that it would be insufficient in point of size, adopting the diameter of pipes that he himself suggested?—Adopting an 18-inch and two 10-inch mains on each side.

3939. *Chairman.*] That was for gas, was not it?—For each, and I think he said a similar size would be sufficient for water.

3940. The same would be necessary for water?—I think he said so.

3941. Mr. *Johnson.*] It is from no experience of your own, or any experiments of your own, that you speak, as to the laying of these pipes, but simply from the evidence you heard given by Mr. Innes?—It is not so; I mean to say that you cannot lay an 18-inch and two 10-inch pipes on each side of that subway.

3942. Can you tell me what in your judgment is the adequate size of the subway for the insertion of gas and water-pipes; do you know the size of the Southwark subway?—Yes.

3943. What is it?—Twelve feet wide and 6 feet high.

3944. What in your judgment would be sufficient, if that is insufficient?—Eight feet wider would be enough, 4 feet on each side of the passage.

The *Chairman* intimated that the witness's evidence was quite trustworthy with reference to the affair of the Imperial Gas Company, but that, with regard to the Southwark subway, his evidence was merely a matter of opinion.

3945. Mr. *Johnson.*] (To the *Witness.*) Do I understand you that the Tottenham Court-road is the most populous part of the Imperial Gas Company's district?—I think it is as populous as any part.

3946. That, I understand you, is the first part where you have a 12-inch main, is that so?—Two 12-inch mains.

3947. Is there any other part of your district where you have the same number of pipes and mains as you have in the Tottenham Court-road?—Yes, in the Pancras-road we have more. Pancras-road leads from King's Cross towards Camden Town.

3948. Your works are very near the Pancras-road?—Yes.

3949. They abut upon the road itself?—They are within a couple of hundred yards of it.

3950. The entrance to your works is in the Pancras-road?—No, it is in the York-road.

3951. That is close by, is it not?—It is at least a quarter of mile off the Pancras-road.

3952. With the exception of the Pancras-road, is there any part of your district where you would have mains more in number than you have in the Tottenham Court-road?—Not more in number, I think, but considerably larger.

3953. They are less in number, but larger?—Yes.

3954. May I take this to be the case, that the maximum number, except in the Pancras-road, near to where your works are, being 12-inch and 6-inch pipes and mains, that the maximum diameter is the 18-inch pipe?—No.

3955. Except the Pancras-road, you have told me—it was incidentally I obtained it

it—you said, I think, that in the Portland-road where the cost was 3 *l.* 5 *s.* 10 *d.*, you had one 18-inch main?—Yes; that has been laid for many years; that is not included in the cost.

3956. That was upon the subject of the 18-inch main; is that the maximum diameter you have of mains for the supply of gas?—No.

3957. Where have you a larger main?—We have a 36-inch main leading from King's Cross, through Drummond-street; it is over a mile long.

3958. That is not a pipe for a supply; it is a sort of a conduit, is it not?—It is; but we have several of them.

3959. I am dealing with streets, and taking the most populous streets, where you only have shops and places of that sort, or private houses to supply, and for that purpose the largest main you have is an 18-inch main, is it not?—I think not.

3960. Where is there a larger main?—We have a 24-inch main crossing the Tottenham High-road, running across Islington, and so on, to our Shoreditch station, for the supply of the district of Marylebone.

3961. You did not tell me what was the per-centage of the leakage; you spoke of the leakage which with all your care you were unable to avoid; but you did not tell us what the per-centage was, or perhaps I ought to call it the unaccounted-for gas, because you include all your loss, whether by fraud or accident, I suppose?—Yes, we include everything.

3962. What is the actual per-centage over any given period of time that you can tell me of unaccounted-for gas in your system?—As near as I can tell you, the unaccounted-for gas is about 12½ per cent.

3963. As nearly as you can tell me, have not you the means of defining it accurately?—Yes, we have the means of defining it nearly accurately, but only by the amount of money received. Our actual amount of leakage is just over 14 per cent. for the last year, but that is without deducting what we use at the works, which is given away for various purposes to the company's officers.

3964. According to your estimate, for all purposes the waste leakage, or fraudulent abstraction, would be represented as nearly as you can give it by 12½ per cent.?—Yes.

3965. That is upon the average of last year?—That is the last year, 1863.

3966. Year by year does it amount to that, because it may be that the longer your mains and pipes are down the greater your leakage or loss may be, or has it averaged that year by year for many years past?—That is rather less than the average of the last three years. We have been laying our mains, and by reducing the pressure we diminish the leakage to a trifling extent.

3967. What do you attribute that to, to the greater care of laying the pipes or the better material of the pipes?—I attribute it principally to the laying of the larger mains.

3968. You do not dispense with the smaller by laying the larger main?—We are able to work with less pressure by having larger mains to connect with the smaller mains.

3969. How long have you been with the Imperial Gas Company?—Twenty years, nearly.

3970. What has been your maximum; has it been diminishing as time as progressed from the commencement, or does it vary year by year?—We have not had an opportunity of keeping an account before the last three years; but for the last three years it has diminished three per cent.

3971. It has been a progressive diminution?—Yes, more particularly since we have been able to lay the larger mains, for the last three or four years.

3972. It has been a progressive diminution of waste by the circumstances of improvements that have been introduced into your system?—Yes, I think so. In the year 1860 we began to lay the 36-inch mains, which enabled us at once to reduce the pressure at one of our stations.

3973. But in the year 1859, what was the actual loss?—I have not got it.

3974. You have no means of giving any comparison?—Not before 1860.

3975. Then you have only three years' experience?—I have four years' experience, and I dare say the company have more experience than I have.

3976. As regards the expense of laying down the mains, I understand you undertake in the first instance the actual cost of opening a trench, laying a pipe, and so on, and for the reinstatement, you refund the parish?—We fill in roughly.

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3977. Then the ramming subsequent to the reinstatement rests with the parish?—We do the ramming.

3978. What is the parish to be reimbursed 1*s.* or 1*s.* 3*d.* for?—For restoring the surface of the granite road particularly. The workmen have to be sent to put it square.

3979. You do it as perfectly as you can, and the parish afterwards put more metal on to fill up the sinking; is that so?—It is not general. I think when a trench is very deep, they generally do not put any metal on.

3980. You say when the trench is very deep; is the cost charged to the company according to the depth which they lay their pipe?—It is not so; all our main laying is done by contract, which includes any depth we like to go to.

3981. Is not the price of the contract regulated by the depth they have to go?—They know the average of our work, and they take the contract on that.

3982. What is the maxumum depth to which you carry your pipes under ground?—It depends entirely upon what obstructions there are; as a rule, we do not care to be more than two feet below the surface.

3983. The nearer you are to the surface the better; but I want to know as a matter of fact, how deep do you really go?—In one case particularly we were as deep as seven feet; but that I think is the deepest we ever went.

3984. You are nearly as deep as the subway in some cases?—Yes; we have to cross some of the New River Company's mains.

3985. In London you are almost close to the surface?—Eighteen inches to two feet is the depth we prefer.

3986. There was some little confusion about the sums which you have given; the sums you have given in the different roads and streets, were simply the amount paid to reimburse the parish for their portion of the work done, that is, the 5*l.* 3*s.* 10*d.*, and 3*l.* 9*s.* 9*d.*, and 5*l.* 14*s.* 4*d.*?—Yes; those were for the parishes.

3987. For the re-instatement of the ground after your work had been done by your workpeople, as efficiently as they were able to do it?—Yes.

3988. Is that the contract sum paid to them, or is it for one job so much, and for another job so much, according to the degree of labour they have to bestow upon it?—It is the contract price.

3989. You mean every parish has a contract price at which they reinstate the roads after you have done your work upon them?—Yes, every parish.

3990. Is that the same throughout?—It is not.

3991. Then what you have given us varies from 1*s.* to 1*s.* 3*d.*; did I understand you to say so?—I said with regard to the laying of mains that they varied from 1*s.* to 1*s.* 3*d.*; they macadamise the road according to the width of the trench.

3992. You say it is a contract price in every instance with the parish; now let us take one particular parish; what do you pay them for the re-instatement as the maximum price?—I will give you St. Pancras parish: we pay them 1*s.* 6*d.* per yard for the macadamised road, we pay them 1*s.* per yard for granite blocks relaid, and if there be concrete under it, we pay them 2*s.* a yard more.

3993. Then it may be as much as 3*s.* 6*d.* per yard?—Three shillings.

3994. Now, that is as regards the parishes; we have taken that to be the *maximum ad minimum* as regards St. Pancras; is it a fair criterion as regards other parishes?—It is a high price.

3995. Is there any higher?—There is not.

3996. Is there any lower in its minimum price?—Yes; Paddington is lower.

3997. What is the minimum price of Paddington?—Ninepence for the granite, where we pay 1*s.* elsewhere.

3998. Are these contracts running from year to year, or spreading over a period of time?—They are not made for any time; they give us notice from time to time that they intend to alter; they are continuous prices till notice is given.

3999. They are not made for any particular duration of time?—They are not.

4000. As the prices vary according to the parishes, I take it that the expense to the company fluctuates?—It fluctuates to the extent of the difference in the paving.

4001. That is what you are reimbursing the parish that you have given to me now?—Yes.

4002. That

4002. That is work done by them to substitute for yourselves?—Yes.

4003. As regards the work done by yourselves; that also, I suppose, varies materially, according to the work done, and the particular stratum through which you have to carry your pipes?—It does vary with the soil somewhat.

4004. Does it vary in like proportion to the variation which we find the parishes insist upon upon the surface; does it vary from 3*s.* 6*d.* to 9*d.*?—Nothing like it; but it is a different kind of paving altogether.

4005. Have you a general contract for the extension and laying of pipes in all your district, or a contract for each work as it arises?—We have a general contract for all new mains.

4006. You mean a contract extending over all time until notice is given on either side?—Yes.

4007. Who is the contractor?—Messrs. John Aird & Son.

4008. Is there a maximum price in their contract for the work to be done, and a minimum price according to circumstances, and do you strike an average, or is it a uniform price throughout?—They contract according to the size of the pipes.

4009. Can you give me the maximum pipe you contract for?—A 36-inch pipe.

4010. The depth is immaterial?—Yes; if they go to an extraordinary depth they sometimes represent the fact to us, and the directors have on one or two occasions allowed a little extra, but as a rule no notice is taken of the extra depth; it is not in the contract.

4011. What is the actual price for laying the 36-inch pipe?—The contract price per yard-run is 19*s.* for laying the 36-inch main.

4012. I do not want to weary the Committee by going through these various pipes dimensions, but taking it to be the maximum price, they diminish in proportion to the diameter, do not they?—They diminish to 1*s.* per yard; the larger pipes are higher in proportion.

4013. *Chairman.*] The shilling is for what pipe?—The shilling would include 2 and 3-inch pipes; 1*s.* 2*d.* would be a 4-inch pipe.

4014. Mr. *Johnson.*] Have you been down at all into either of the subways of late?—Yes; I was down in the Covent Garden subway this morning.

4015. Did you see any pipes laid there then?—I saw some underground.

4016. Have you been in the Southwark subway of late?—Not since the first notice of the introduction of the Bill.

4017. You have never yourself, either by blocks of wood or by any means of ascertaining the size of the different pipes, endeavoured to lay them within the existing subways, so as to judge how far they are practicable?—I have.

4018. Where?—We built a small subway, in the company's works at Shoreditch, to try it.

4019. What sized subway did you make?—When I say small I meant in respect of length; it was the same size as the Southwark Subway, six feet radius.

4020. *Chairman.*] How long was it?—There was room enough for three pipes' length.

4021. Mr. *Johnson.*] You did that at your own works?—Yes.

4022. Have you any section showing me how you laid those pipes; did you lay the pipes to see how it was practicable?—We laid on the one side a 24-inch and a six inch.

4023. Are they there now?—No, they are pulled down.

4024. *Chairman.*] What was the size of the pipes?—On one side 24 inches, and six inches.

4025. And on the other?—Eighteen inches and 8 inches. Those pipes encroached three inches in the passage; we could not get a clear three feet of passage with those pipes.

4026. Mr. *Johnson.*] You had four pipes altogether?—Yes.

4027. You told me the width was the same as the Southwark Subway?—Yes, six feet radius.

4028. Do you mean to say there was not room for the pipes?—There was room for those pipes if we encroached three inches in the passage, and made the passage two feet nine inches instead of three feet.

4029. If you have a section there it would help me. Were they laid on the

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ground or raised upon piers?—They were raised upon piers, 9 inches from the ground.

4030. Does that section denote the particular position in which the pipes were laid (*referring to a plan put in by the witness*)?—It does not represent the exact size.

4031. One word as regards the accidents, I think you spoke of two, did I understand the first one to be in Albemarle-street before you were there?—Yes.

4032. And the particulars of that you know nothing of except from other people?—I do not.

4033. The only one you spoke of was as to the two men who were down near the sewer?—The accident was in Holborn.

4034. Was that where the gas had escaped from the ground to the surface, or was it in the sewer?—It was in a main on the surface.

4035. I thought there was one you spoke of where you said there had been some leakage into the sewer?—I do not know that I spoke of it; but we had one man suffocated inside a 36-inch pipe; he was cementing the joints inside; there was an escape inside, which we could not discover; and in that case the candles kept alight in the pipe.

4036. That man would have been suffocated whether in the subway or anywhere else, if he got inside the pipe?—There must have been a very small quantity of gas in the pipe; there was nothing to explode. We found afterwards there was a slight escape at the end of the pipe that had been blocked up; it got through and killed the man.

4037. Was he working inside the pipe?—Yes; he was cementiug the inside of the pipe.

4038. How do you know that the gas killed him?—The surgeon at St. George's Hospital said that he had died from sulphuretted hydrogen.

4039. *Chairman.*] And you found an escape of gas?—We did, afterwards.

Re-examined by Mr. *Richards.*

4040. He died of sulphuretted hydrogen?—Yes.

4041. Where was that subway you were speaking of, which had been tried with an 18-inch, a 24-inch, and a 6-inch main?—On the Imperial Gas Company's works at Shoreditch.

4042. In that way you tried nothing but gas pipes; you introduced no water-pipes at all?—They were empty pipes.

4043. Have you seen the Southwark subway during the last few days; I am told they have put down an 18-inch pipe?—I have not; I was past it the other day, and I saw that they had brought up a 10-inch pipe, broken.

4044. You saw them bring up a part of a pipe broken, but you did not know what they had laid down inside?—I did not.

4045. As to the leakage, you state the unaccounted for gas to be 12½ per cent., are you able to form any opinion at all as to what the actual leakage through the pipes into the soil is?—I do not think anybody knows accurately, but my opinion is that it is small.

4046. The unaccounted-for gas, I understand, includes the gas used in the works, and gas lost by compensation?—Yes, and gas not registered, which is a very large item.

4047. Gas not registered by a bad meter, and gas stolen in the consumption by the public lamps?—It included all that.

4048. And I think you said gas given to the company's officers; do you mean that some of the officers receive a certain salary, and have a house and gas as a part of their salaries?—Yes; and the various offices are supplied.

4049. And the various offices of the company in different parts of the town are supplied also?—Yes.

4050. All that is to be deducted from the 12½ per cent.?—From the 14 per cent.; last year it was just over 14 per cent.

4051. All that has to be deducted from the 14 per cent. to arrive at what is actual leakage?—Yes; but the non-registration of meters is the principal cause of the unaccounted-for gas.

4052. The non-registration of meters you consider to be the principal cause of the unaccounted-for gas?—Yes; I can prove it to you. This is the result of testing a large number of meters (*handing a list in to the Committee*), and you will see that the number of meters re-proved at the company's works during the two years-and-a-half between June 1856 and December 1858 is stated here; it

first

first states that the number of wet meters proved effective is equal to 7½ per cent. on the number in use, and the dry meter is equal to 4½ per cent. We do not allow meters to be put up except they are tested.

4053. Are the meters stamped under the Sale of Gas Act?—Yes; and one per cent. is allowed against the sellers of gas; a range of five per cent. is allowed, two per cent. in favour of the seller, and three per cent. in favour of the buyer. The number of meters that allowed gas to pass without any registration at all was 851.

4054. What percentage is that?—It is not laid out in percentage at all.

4055. That is a large item, however?—Yes; it is equal to more than five per cent.

4056. Then all that must be deducted before you arrive at the actual leakage?—Yes.

4057. We know that the gas put into the gas-holders expands considerably under the heat of the sun?—Yes.

4058. That would be accounted for in its expanded bulk?—Yes.

4059. In distribution to the customers it goes out and is sold for a much smaller quantity?—It is sold at a considerably less temperature than it is measured at.

4060. And in a smaller bulk?—Equal to 1½ per cent. for every five degrees of temperature.

4061. So that the gas measured in the afternoon of a hot day and sold in the evening would lose 1½ per cent. for every five degrees of temperature?—Yes.

4062. That would go down as unaccounted-for gas?—Yes, it is all included in that account.

4063. *Chairman.*] Do you happen to know how many yards of gas-pipes there are in any large public building?—We do not take any pipes inside the buildings.

4064. Do you know how many yards there may be in any buildings; do you supply a large manufactory?—Yes; we supply the North-Western and Great Northern Railway Stations; they have, very likely, a mile and a half or two miles of pipes, but I cannot tell you accurately.

4065. Have you had any accident with your pipes?—No; the mains are nearly all in the open yards.

4066. Mr. *Powell.*] Are they buried in the yards?—Yes.

4067. *Chairman.*] In stating the size of a pipe do you take the outside?—No, the inside.

4068. A 36-inch pipe takes more space than 36 inches?—It takes up 44 inches outside to outside with the sockets.

4069. Mr. *Powell.*] Without the sockets what is it?—Thirty-seven and-a-half inches the plain part of the pipe would occupy, and from outside to outside of the sockets it would be 44 inches.

4070. Mr. *Floyer.*] In that experimental subway that you spoke of, were the pipes all arranged on one level?—Yes; on brick piers, as suggested, on one level.

4071. Mr. *Powell.*] Do you lay your gas pipes on a mathematically level surface?—We do not; we must have an incline.

4072. Can you give the rate of that incline?—Supposing these 18-inch pipes were to be laid on piers quite firm, without any probability of subsidence, we could do with a quarter of an inch in 12-feet incline, but practically, in the street, we require not less than three-eighths to half an inch.

4073. What is the minimum elevation for the working of gas-pipes?—Three-eighths of an inch in 12 feet.

4074. But where your ground was solid, and no subsidence, what will it be?—I think we might do with a quarter of an inch in 12 feet, if we were to use them in subways; being level, we should block up all the entrances in the course of 300 yards.

4075. In digging a trench for a 36-inch pipe, what would be the width of the trench?—The length of a 12-inch pipe would be about four feet; but outside the sockets where the joints are made, we must have at least six feet.

4076. What width would you make it round the pipe?—For a 36-inch pipe we must have two feet round the pipe.

4077. You must have two feet round the outside of the pipe on each side?—

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Two feet round the barrel of the pipe, and about 18 inches outside the sockets; a man must get down to the bottom of the pipe to the socket where the joint is made. I saw a 16-inch main being laid, and the joint-holes there were 3 feet 9 inches across; that was the least the man could do with to get down to the bottom of the pipe to make the joint.

4078. You spoke of the space occupied by a valve for a 36-inch pipe; I do not think you gave it quite clearly?—It was 12 feet across the street; we are obliged to lay them across the street. We do not generally lay them upwards, as the water companies do; we lay them across the streets; we could do with something like nine feet, with a different construction of valve.

4079. Is it as efficient?—Very nearly so; it would not last quite so long.

4080. Has your attention been directed to the injury done to the roadway beyond the area actually broken?—In granite pitching with concrete, we generally give something like six inches on each side over the trench that we use to cover the sinking, but the concrete is not disturbed under that.

4081. Of the number of openings you have mentioned, what proportions would be in the roadway as distinguished from the footway?—Fully two-thirds where the mains are not in the footway, which is the best way to lay them; we get the service-pipe direct in without being complicated with bends, and, of course, we disturb no roadway at all; but in the other roads, where we have two mains, the mains are two feet from the kerb.

4082. What is the thickness of the metal of a 36-inch pipe?—From seven-eighths of an inch to one inch.

4083. And the socket, how much?—The thickness of the socket is three-and-a-half inches to four inches.

4084. Give me the same calculation for the two-inch pipe?—From five-eighths to three-fourths of an inch.

4085. And the socket?—From three to three-and-a-half inches.

[*The following Table was delivered in, and is as follows*]:

WIDTH OF PIPE SOCKETS.

3-inch	- - - - - - -	6½ inches.
4 „	- - - - - - -	7¾ „
5 „	- - - - - - -	9¼ „
6 „	- - - - - - -	10 „
8 „	- - - - - - -	13 „
10 „	- - - - - - -	14 „
12 „	- - - - - - -	18 „
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Witness.] That is, including width of the sockets, the receivers are much more bulky; we must necessarily use receivers where there are gasmains to take the water off; we have an incline, so that the water goes into the receivers.

4086. How do you get the water out?—We pump it out; we have a plug in the pavement similar to that of the waterpipes.

4087. How often do you require the pumps?—We have 10 men continually at work attending to the pumping and receivers.

4088. How often would you send a man to the same receiver?—Generally once a week, but some receivers require attending to much more frequently than others.

4089. What number of valves have you on your mains?—The valves are not very numerous.

4090. Can you give us any idea of the frequency of them?—We have not more than a couple of hundred valves in our district.

4091. For the large pipes and small pipes?—Large and small pipes; the receivers are very numerous; we have numbers of them.

4092. *Chairman.*] Do you often return pipes as unsound?—Not of late; we have had them made by one maker for many years; one per cent. would represent the returns.

4093. Is

4093. Is there any penalty on the returns?—No. Mr. *T. Hersey.*

4094. Mr. *Powell.*] In working a system of gas pipes are you compelled by scientific necessities to fix your valves at certain points, or may you vary the points?—We are not fixed by scientific points, except where there is a great rise. 27 May 1864.

4095. You exercise your option?—Just so.

[The Witness withdrew.

Mr. *Horatio Brothers,* sworn; Examined by Mr. *Toulmin Smith.*

4096. I believe you are engineer to the Equitable Gas Company?—I am. Mr. *H. Brothers.*

4097. What experience have you?—Upwards of 20 years'.

4098. Is the Covent Garden subway within your district?—It is.

4099. Perhaps you can tell us whether it was your company that laid down the main which is in the Covent Garden subway?—Yes.

4100. What is the size of that main?—Two five inches.

4101. Is the main laid on the surface or under the ground?—Under the ground.

4102. What is your reason for laying it under the ground instead of on the the surface?—My reason simply was to prevent other parties going in from fracturing the main. From experience I have found that mains laid on the surface are offensive; there is an effluvium rising from them which the earth would prevent.

4103. That effluvium arises from leakage from the pipes?—It arises from exudation in the pipe itself.

4105. Did you hear Mr. Simpson's evidence?—Yes.

4105. You heard him speak of the fact which he had ascertained, that leakage takes place not only from fraction and badly made joints, but through the substance of the iron?—Yes, I heard it; and I can corroborate it from my own experience.

4106. You speak from experience?—Yes.

4107. So that no amount of care in laying the pipes in the subway would prevent the actual leakage taking place?—No amount of care. I have tried them with lights, and find no ignition; still there has been a great effluvium from the pipe itself.

4108. Have you had an opportunity on your own works of trying the consequences when gas pipes are laid in the subway?—Yes.

4109. Will you describe to the Committee the subway you have in your own works, and the length of it?—The leading pipes from our works to our district pass underneath the store-room of the company; its length is about 80 feet; it is not an arched passage, but simply boarded over. Over a portion of that the Board-room is situated, and I have found, and I may say the directors have found also, that in foggy weather the effluvium arising from the mains is so great, that we have been compelled to have the windows open.

4110. In that subway of your own, was the ventilation what you would have considered complete; were there gratings at the ends and sides?—The ventilation was as good as we could practically make it.

4111. But the effluvium was found disagreeable?—Yes.

4112. Whenever heavy pressure was put on, did you find any difference in it?—Of course it was greater.

4113. In the case of the pipes buried under the earth, do you find the same results?—Not to the same extent; in fact, I have covered the pipes with clay to prevent it.

4114. Then you would agree further with Mr. Simpson that the close packing of clay prevents the passage of gas through the substance of the pipes?—It has done so in this case.

4115. It is also safer to the public to bury them in the ground of the streets rather than putting them in an open subway?—That is my opinion.

4116. What is the action of cold or frosty weather upon the pipes in respect of the joints?—The action of cold always contracts iron; and the consequence has been, in a subway, whether we have a 20-inch main or whether we have a 15-inch main, after a severe frost we have to send in a man to fill up the joints.

4117. The joints are drawn by the contraction of the iron?—Yes, more or less.

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4118. Of course in all these subways, if well and properly ventilated, there will be a liability to contraction?—Yes, if they are properly ventilated you will have a draft of cold.

4119. What is the size of your largest main?—Thirty inches.

4120. How many of those have you?—Only one.

4121. Where is that?—From our works on the Thames bank to Charing Cross.

4122. In the district through which your pipes pass, do the pipes of any other companies pass?—The pipes of the Chartered Gas Company, and the Phœnix Gas Company, and the Chelsea Water Works are in some portions of the district.

4123. With respect to the escape of gas within a confined space, do you necessarily find greater danger arising than where the space is larger?—Yes, of course, when you have a confined space the escape of gas must always be dangerous, because you have no means of allowing the gas to escape into the air.

4124. Where have you found actually the greatest number of explosions have taken place; in houses?—In houses; my experience has been that in fitting up houses, the pipes are laid along the rafters underneath the floor, and the gas-fitter perhaps in putting the board down has driven a nail into the soft pipe, an escape has taken place, and some party in the house going to look for the escape has applied a light, and there has been an explosion, simply because the gas has been confined between the rafters; whereas, if the escape had been in the room itself, there would have been no explosion at all.

4125. It is the confinement of gas within a small space that is dangerous?—Yes.

4126. When the pipes are laid on the surface of the earth, the gas has an opportunity of escaping upwards?—Yes.

4127. Will not the consequence of a leakage in the subway, where there is not an opportunity of the gas escaping, although the leakage should be less, be much more dangerous to the public?—Decidedly so.

4128. What amount of gas could escape through the permeation of iron; how many cubic feet an hour?—That I cannot give any evidence upon; I never tried it; in fact, I may say this: it is in such small particles that you cannot ignite it; the nose detects it, but you cannot artificially detect it.

4129. You say the nose detects it; the last witness said that even where the nose cannot detect it, it may be fatal to life; do you agree in that evidence?—I should not go so far as that.

4130. Do you think there may be gas in a subway or confined space, which may be dangerous, although not sensible to the senses?—I cannot say that, I believe that to be the case; my experience has shown that a small quantity of gas indeed is easily detectable.

4131. In the case of your own subway, did you detect where it was that the gas leaked?—No; there is an exudation from the pipes in such a small degree from every pore, that it is not detectable by light, but it is so by the sense of smell.

4132. No amount of inspection would enable you to stop the leakage in the subways?—No, it is natural to the pipe itself.

4133. Have you considered the cost of laying pipes in the subways as compared with the London streets?—Yes, I have.

4134. Have you any figures there?—No, I have no figures; in laying our pipes in the Covent Garden subway we did not take any exact data; our men were working in it between times, to make up time, and we have no other data as to the fact; but from what we do know of it we are quite of opinion that it is about one-third greater than it would be in the road.

4135. You have experience of the cost of laying your pipes in the open streets?—Yes.

4136. And you are able to form an opinion of what the necessary work would be that would have to be done in the subway?—Yes.

4137. The increase or decrease of the expense, and the various items?—Yes.

4138. Is the result of these calculations a less or a greater expense?—I find a greater expense.

4139. Should

4139. Should you have to lay two mains in the subway, or would one be enough?—We should have to lay two mains in the subway.

4140. In laying mains, do you use lead or cement?—We use lead.

4141. You could not join them without the use of fire in the subway, I apprehend?—No.

4142. Would it be possible, or at least possible without a very great deal of inconvenience, to serve your customers with only one main in the subway?—No. In the Covent Garden subway, when we put in a service, we turn the gas completely off the subway, much to the inconvenience of the people in the street.

4143. When you lay a service to a fresh house, you inconvenience all the other houses for the time being?—Yes.

4144. Do you think Mr. Bazalgette's proposal to lay a second pipe across the roof of the subway would be one that could be carried out?—It appears to me rather an extraordinary way of laying a pipe; it appears to me a very unworkmanlike way of laying a pipe.

4145. Would it be a convenient pipe to take the services from?—If we have to dip and rise again, we must have a syphon to catch the condensation.

4146. If you thought it would be an accommodation to yourselves, and to the public, you would prefer laying pipes in the subway, if it could be done with safety?—Our company, when they agreed to lay pipes in the Covent Garden subway did so on the condition that we should be allowed to lay them as we lay them in the streets, viz., under the soil.

4147. Do you pay any rent for laying them there?—No.

4148. Do you find, from the experience that you have had there, that there is any convenience derived by your company from the opportunity of laying pipes in the subway?—There is an inconvenience in many respects, because in pumping the syphon, which we have to do, a man has to go down the subway to inspect the pipes and pump the syphon, whereas he could easily do it from the streets.

4149. The longer the subway is, the greater that inconvenience would be?—Decidedly so.

4150. Do you find that there is no counteracting advantage to the companies?—I do not see any myself.

4151. Supposing your pipes were laid above the earth, do you see increase of danger from the escape of gas?—I see there would be a great increase of the danger. When I see the small quantity of gas required to make an explosion in 100 feet of that subway, and at the most explosive point, I am certain, with the greatest care, and you cannot get working men to be as careful as you would wish, there would be occasionally explosions.

4152. I suppose the pipes cannot be laid with as great ease, certainty, and nicety in the subways as in the open air, where there is daylight?—No. We lay our pipes well; we try every joint with fire before throwing in the ground, and we could not do more in the subway; we should not have the opportunity of inspecting them by daylight.

4153. Do you find men object to work underground?—We have to pay them extra, and give them beer, and allow them to come up to the surface to get fresh air every hour.

4154. Therefore you find no saving of expense, no saving to the companies, an increased danger, and an increased cost?—Just so.

Cross-examined by Mr. *Wilkinson.*

4155. You laid down the pipes yourself in the Covent Garden Subway, did you?—They were laid down under my directions by our Chief Inspector of Mains.

4156. Have you the cost of the laying of those pipes?—I have not the cost of laying them.

4157. Was it done by day-work or by piece-work?—I have acted upon this principle, and I have laid a large quantity of mains. I always lay my mains by day-work.

4158. Did you do so in this case?—Yes.

4159. How much did you pay your men for a day's work?—We paid them the usual day's wages, and gave them a pot of beer extra.

4160. That was the only difference you made between this particular instance and your usual course of working?—That was so.

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4161. Did your men make any complaints of the want of air, and the necessity of coming frequently to the surface?—They did; and we allowed them the privilege of coming to the surface about every couple of hours; they complained very much of the smoke, I presume.

4162. Was the beer supplied to them above or below?—I presume it was supplied when they came to the top for a blow.

4163. I did not quite gather the reasons which you gave my learned friend why you consider that this work was more objectionable than the usual process of laying the pipes in the street. You say you laid down two mains, one main of 18 inches was it not?—No, two five-inch mains only.

4164. What was your object in laying down those two five-inch mains instead of one larger main?—If we had had one large main we should have had to cross the subway with our service-pipes, and those service-pipes would have been in the way of any other person coming in.

4165. How would your pipes be in the way of any other person coming in if you had laid them underground?—I mean they would be in the way of any other pipes coming in belonging to persons authorised to lay pipes in the subway.

4166. Would there have been any greater difficulty in arranging those service pipes in the subway with reference to inconvenience to other pipes than there now exists in the street; you have the same precautions to take in the streets have not you?—Yes; if we had laid them in a street we should have laid them if there had been nothing in the way under the footpath, one on each side.

4167. Would there not *primâ facie* be greater facility for avoiding interference with other pipes where the surface is exposed and open, than where it is covered?—We were in the subway the first, and we took steps to put our mains as much out of the way as possible, and we laid them under the surface on purpose to get a fall for our services to the houses.

4168. I understand you that of the two objections that occurred to you, one was the exudation from the pipes and the other I did not quite catch?—If we had laid them on the surface of course there were other parties to follow us who had power or permission to lay pipes.

4169. Then, I understand you that it was a desire to avoid interference with other parties if you had laid them on the surface, and the second reason was the fear of exudation from the pipe itself?—Yes, and to prevent our pipes being fractured by other parties.

4170. Do you consider there is greater risk of the fracture of a pipe in a subway, than if the pipe be exposed to vibration on the surface of an ordinary street?—By carelessness? yes.

4171. What description of carelessness do you allude to?—Water Companies, and Telegraph Companies, laying down pipes.

4172. By carelessness you mean the particular damage done by servants of other companies not wilful but actual damage done?—Yes.

4173. Damage occasioned by the servants of other companies?—Yes.

4174. Do you consider that the danger of fracture from such a cause is greater than the danger of fracture from vibration where the pipe is laid in the ordinary way in the street?—My experience has told me with regard to the pipes I have laid in streets over which there has been great traffic, that the danger of fracture would be equally great in one case as in the other.

4175. You have no experience of the subways, have you?—I have as much experience as any other person has.

4176. You cannot contrast the experience of the two systems?—The only subway I know of where pipes are laid is the Covent Garden subway, and we laid our pipes there.

4177. And as yet you have had no fracture?—No, because we have buried them in the soil.

4178. Have there been any circumstances which would reasonably induce you to believe that you would have had a fracture if they had been laid on the surface and not in the subway?—I was not there when the Water Company were laying their mains, and therefore I cannot answer that question.

4179. With reference to exudation from the pipes, I understand you to say it prevails extensively now?—It does.

4180. Of course it prevails equally so far as the exudation is concerned, where the pipe is laid in the street, except so far as it may be prevented by a coating of clay to which you alluded?—Yes; you must bear in mind the earth absorbs a great

great deal of effluviun, that you would have up the gratings if laid in the subways.

4181. Does it occur to you there would be any difficulty, if the pipes were laid in the surface of the subway, in covering the iron with a coating of some kind of paint, or some thick cement, or something in the nature of cement, that would answer the purpose of clay?—I have done it, but I have found no practical benefit from it.

4182. What did you try?—I have tried paint and boiled gas-tar, with pitch, which is as good as anything.

4183. Do I understand you that the clay which is gathered round the pipes, by its mere embedding in the earth, is found to produce the results which you have been unable to effect by the application of any of these substances, either gas-tar or paint?—Yes; I have known a real space between the pipes embedded in clay, and that has gone on for a long time, and no perceptible leakage has taken place; it has been as good as the joint.

4184. And has prevented the exudation?—Yes.

4185. Would there be any difficulty in applying a coating of clay?—Do you mean if you fill in the subway with clay?

4186. The clay cemented would be better than clay uncemented; there would be less porosity?—Do you mean a sort of liquid clay—mud?

4187. Something which should have the effect you say the clay now produces in the earth itself: surely there would be no difficulty in arranging such a coating as the earth now supplies?—I have never found any coating except a bed or body of clay itself, over which I have put concrete to prevent the heat getting to it, and so prevent the clay from splitting.

4188. Your experience of the present mode of laying pipes must convince you that the exudation is not at all checked by the clay, but is only absorbed by it?—The exudation actually going on is not prevented, but it is absorbed, and any leakage that would be in the pipes or joints would be prevented by the clay.

4189. How would it be prevented; is it not the fact that now the surface of your pipes is found to be blackened by the impregnation of the gas?—In some cases it is so.

4190. Is not where it is not so the exception and not the rule?—It is more so in London than any place I know of. I have had a long experience in the country, and I never found it so great as in London.

4191. I thought London was rather celebrated for its clay?—We do not go deep enough for the London clay.

4192. How do you account for the difference between the London earth and the country earth?—In London streets there are many more mains than in the provincial towns, and that may be one reason.

4193. Did I not understand that when a main was larger the pressure was less?—You did not understand me to say so.

4194. Do you agree with the previous witness in that assertion?—Where you have a larger main you can work at a less pressure; it does not necessarily follow that the pressure should be less, but you require a less pressure to supply the consumer.

4195. The greater the pressure the more the expenditure of gas?—Yes.

4196. The gas companies do not apply more pressure than is absolutely necessary?—Of course they do not.

4197. Therefore the larger the pipe the less the pressure?—Yes.

4198. And, consequently, the less the risk of this exudation?—Yes.

4199. Still I wish to know why, although these pipes are larger, you still find the exudation is more with the larger pipes than in the country with less pipes?—I do not say so; I say this, that the way I account for the soil in the London streets being more impregnated with gas than the streets in the towns in the provinces is, that the surface of the mains in the streets is larger, the surface presented to the soil is greater, and a greater quantity of gas passing through.

4200. Have you made calculations of the loss of gas, either by leakage or other causes, so far as your company is concerned?—Yes, by leakage proper.

4201. What do you mean by "leakage proper"?—All the gas that we do not sell we call "unaccounted-for gas," and that is, in ordinary terms, called leakage.

4202. When you say "leakage proper," you do not mean that to include all the unaccounted-for gas?—Just so.

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4203. Will you explain what you mean by "leakage proper"?—The "leakage proper," so far as refers to subways, would be the leakage from the mains in the streets.

4204. That would be leakage in part occasioned by exudation through the pipes, and partly from the imperfection of the pipes?—Yes.

4205. Will you give me the amount of that leakage?—From any actual experiments I cannot, but our unaccounted-for gas embraces so many things. I have found, practically, that of what is called absolute leakage, which goes in the unaccounted-for gas, a great deal is in the works themselves, from the old gas-holders; they are large cylinders with a great many joints, and I have known an extensive leakage from them.

4206. Can you give anything like an accurate estimate of your loss from the "leakage proper," by deducting from the general amount of leakage a sum in respect of it?—My opinion is that it ranges from three to five per cent.

4207. That is in respect of "leakage proper"?—Yes.

4208. What is your general amount?—About 12 per cent.

4209. Then you agree with the last witness?—Yes.

4210. *Chairman.*] In money what is it?—For gas our income is about 70,000 *l.*

4211. Then it is 3 per cent on 70,000 *l.*?—Yes; but you must not take the selling price of the gas, but the cost-price of the gas in the gasholders.

4212. Mr. *Wilkinson.*] That is your idea of it?—It is so; I simply go by the money we lose.

4213. The money you lose is the money the gas costs you without the profit?—Yes.

4214. You say you have made an experiment yourself, in your own works, of the way in which the pipes would be affected if laid in the subway?—We made no experiments: I explained before that our leading mains, from the works to our district, pass under what I may call a subway.

4215. And that is a boarded floor?—Yes.

4216. What is the extent of the pipe that passes under that boarded floor?—A 30-inch main and two 15-inch mains.

4217. For what length?—For about 80 feet; we supply common and cannel gas; we have duplicate pipes in our district.

4218. What amount of pressure is there there?—The maximum would be about twenty-two tenths, and the minimum about eight-tenths.

4219. Is the pressure greater or less than in the ordinary pipes passing through thoroughfares?—The pressure diminishes as the distance increases: this being the initial pressure at the works, it would be a little larger than the pressure in the district.

4220. The initial pressure will be larger than the ordinary pressure of the mains in the public thoroughfares?—Yes.

4221. Have you tried any coating over those pipes?—Yes; I have had them tarred and whitewashed.

4222. Did you find neither of those remedies effectual?—They were not effectual.

4223. It did not mitigate the evil in any degree?—Not to any appreciable degree.

4224. Whether coated or uncoated, the pipes would be equally liable to exudation?—To a degree; if you fill up the pores you may, to a certain extent, stop it.

4225. Do not say you may: I ask, did you stop it?—I did not do it sufficiently to prevent the nuisance arising.

4226. How long have the pipes been underground?—Nine years.

4227. And they have been always in the same state?—Yes.

4228. Have the directors been accustomed to meet there?—Yes, once a fortnight.

4229. Are they obliged to go out and have a blow?—I have known the chairman of the company once in the room say he could not bear it.

4230. But he has submitted to it for nine years?—Some years back I had them covered with clay.

4231. You had them actually covered with clay?—Yes; they are buried in clay now.

4232. Is that effectual?—It is effectual.

4233. How

4233. How came you to move the clay?—I have not done so.

4234. They are covered with clay now, are they?—Yes.

4235. Would there be any sort of difficulty in doing the same thing in the subway as you have done there?—If I am compelled to use the subway, and lay a main in it, and if the Metropolitan Board were willing, I should like to cover them with clay.

4236. If you had that permission, you do not apprehend much danger from the exudation of gas?—Not to any great extent.

4237. One question with regard to the danger to the joints; I understand you to say that one great cause of that danger was the action of cold and freezing upon the joints?—Yes.

4238. Do you suppose that the temperature of the subway would be more liable to excess of heat or cold, than the temperature of the air outside?—Unless you get a very good draft in the subway the least escape of gas would be highly dangerous.

4239. One question upon that. I presume the most perfect safety would be to have the gas in the open air, so that it may mix freely with the atmosphere without any confinement?—Yes.

4240. In proportion as you multiply the openings and access from the subway to the external atmosphere, that condition of things which exists in the streets is arrived at?—Not altogether so; what I maintain is this: in a confined space in the subway, sometimes you might get the air at the same temperature as the atmosphere above, but you would have no draft at all; you want the means to change the air periodically, and unless you have some means of doing that the pipes laid in the subway would be highly dangerous.

4241. Have you directed your attention to the means of ventilation proposed in the Covent Garden subway?—Yes.

4242. Have you directed your attention to that particular place?—Yes.

4243. Did you observe the gratings at intervals?—Yes.

4244. Does it appear to you as those exist in the Covent Garden subway, there would be greater risk of injury to the pipes by frost than if the pipes were laid in the street in the usual way?—My opinion is that there is a great deal less risk of contraction of iron with pipes laid in the earth than there could be in pipes laid in the subway.

4245. *Chairman.*] You mean laid bare in the subway?—Yes.

4246. Mr. *Wilkinson.*] Still I understand you that it is not that the excesses of temperature are greater, but a pipe in the subway lacking the protection of the circumjacent earth, would be more liable to be affected by the external atmosphere?—As the subways now exist they are not sufficiently ventilated.

4247. As the subways now exist. I ask the question with regard to Covent Garden, is that insufficiently ventilated at present?—Decidedly so.

4248. Is the Southwark-street insufficiently ventilated, in your judgment?—It is.

4249. You think that both these subways are insufficiently ventilated, as they now exist?—Yes.

4250. Do the Equitable Company follow the same system as the last witness spoke to of paying the parishes a certain amount for reinstating the streets?—Yes.

4251. What rates do you pay?—We pay 2*s.* a square yard for granite paving.

4252. That is without concrete?—The concrete is underneath that.

4253. What do you pay then for the macadamised road?—I cannot answer that question exactly.

4254. Give me the granite pavement, without the concrete?—As the granite pavement is laid in the streets, we pay 2*s.* the square yard.

4255. That is with concrete?—Yes.

4256. Where it is laid without concrete, what do you pay?—A little less.

4257. Where the concrete is used, I understand you pay 2*s.* only, not 2*s.* plus anything else?—No; 2*s.* the square yard.

4258. You said something about the greater difficulty in getting in the service pipes; what greater difficulty would exist in connecting the service pipes with the main pipe in the subway than now exists in the street; I think your objection was to some mode of crossing. Would there in fact be any greater difficulty in connecting the service pipes with the mains in the subway than in the streets,

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as they are now laid?—I do not think there would be any great difficulty; there would be greater danger.

4259. Why a greater danger?—Because you have a confined space, and, in connecting the service pipes with the main, you have an escape of gas more or less.

4260. Supposing that difficulty of confined space removed, then your objection ceases; that is the only ground of objection you have?—Yes.

4261. There is no other difficulty in making a connexion?—It is more expensive.

4262. I think you told my learned friend that that is simply a saying without any data?—We know it practically, because in laying services in Covent Garden Subway we cannot get our men to work the number of hours; it is more inconvenient to take the piping and tackle down into the subway, and we find practically that it is one-third greater expense laying the service pipes in the subway than laying them in the street.

4263. You told me that you paid the men the same ordinary wages for a day's work, with a glass of beer extra?—Yes; but they do not work so long.

4264. Do you mean that the hours are less?—Yes; and there is the inconvenience of getting into the subway itself.

4265. Do you mean by inconvenience, the actual time employed going up and down?—Yes.

4266. What do you estimate that at?—Taking the whole, we consider it is about one-third greater expense.

4267. But you have no data to give us?—Yes, we have, in the services that we have laid there.

4268. Tell us what the cost was: you told me you could not give it?—It is not really in my department.

Re-examined by Mr. *Toulmin Smith.*

4269. You were asked about the difficulty in the connexions; is there not a difference in the levels between the pipes in the subway and the pipes in the street?—Yes.

4270. In making the connexions, you have to provide bends?—Yes.

4271. That would be an extra expense, and adds another item to the expense generally?—Yes.

4272. Another point of expense has been the wages of the men?—Yes.

4273. Do I understand you that the wages nominally were the same, but that they work for a less time for the same wages?—Yes.

4274. So that it comes to precisely the same thing as if they had charged more for a day's work?—Yes.

4275. If the pipes were above the ground, what room would be necessary, in your opinion, to lay them in the first instance, and repair them, if repairs were necessary, can you give it?—Taking the large pipes, we should require 15 inches clear space round them.

4276. *Chairman.*] Which do you call the large pipes?—The 12-inch, and upwards.

4277. Mr. *Toulmin Smith.*] Is that the ordinary size in use?—Yes.

4278. You spoke of the inconvenience you wished to avoid from other persons who might have the right to bring in the pipes; do you anticipate that the workmen, with their tools, and the carrying backwards and forwards of the pipes, would be causes of danger to your pipes?—Yes.

4279. If the subway was packed with the pipes of several companies, every fresh company that came there would increase the danger?—Yes.

4280. As to the exudation of gas through the substance of the pipes, and as to the varnishing of the pipes, is it not the fact that the clay is useful, not by a thin coating over, but because it is packed up?—Yes.

4281. It is the mass of packed clay that makes the exudation less, and so harmless?—Yes.

4282. Is it possible to be done in a subway where there are many pipes packed together?—I do not see how it could be.

4283. If all these pipes in the subway were packed with clay, what opportunities would you have for inspecting the condition of the pipes?—None at all; the subway itself would be stopped up.

4284. Is

4284. Is not there another reason why it is desirable to have them in the earth, because they are less liable to contraction and expansion when buried than when exposed to the open air?—Yes.

4285. And on the point of ventilation, can there be any true ventilation unless there is a steady current of fresh air coming into the subway?—It is not possible.

4286. Does not it necessarily follow that there will be a greater amount of contraction and expansion in the subway than can exist when the pipes are buried in the earth?—Yes, if there is a proper current of air through.

4287. Will it not follow then that there is an increased danger of leakage from that special cause?—Yes, and increased danger arising from the extra contraction of the pipe.

4288. *Chairman.*] Have you any pipes across the bridges?—We do not cross the bridges.

4289. Have you any practical knowledge yourself of exudation on the bridges?—I have not.

4290. Have you any length of pipe in any public establishment?—Exposed, do you mean?

4291. Yes; in manufactories, or prisons, or workhouses, where they run along the walls?—I am not aware of any.

4292. You do not know whether there is any exudation from the pipes in any public establishment?—I am not aware of any complaints of that description; I am not aware we have any such pipes exposed.

4293. Is Pentonville in your district?—It is not.

4294. Mr. *Floyer.*] You spoke of the loss of time arising from various circumstances when the men are at work in the subways; do you find an equal amount of work is done below as is done above?—When a man is working if he is work- for an hour upon the surface or working for an hour in the subway, the amount of work would be pretty much the same, but it would not be so carefully done, because the man cannot see what he is doing.

4295. *Chairman.*] Have you had any accidents yet in the Covent-garden subway?—We have had none.

4296. How long have you had your pipes there?—To the best of my knowledge, from two to three years.

4297. How long is a man connecting a service pipe generally, with the main?—It entirely depends upon the size of the service pipe; it is not a long operation, and if carefully done with drilling, there need not be a large quantity of gas escape, but you cannot always answer for the men.

4298. You would rarely use a chisel?—We do both; but the chisel to me is an objectionable way of doing it.

4299. It is only a thing of hours, it is not a thing of days?—It is a thing of minutes, not hours.

4300. You mentioned there was considerable inconvenience to the neighbours in putting in a service pipe?—Yes; we should find some difficulty in getting a man to work in the subway unless the gas was turned off, and to set our minds at rest, and to relieve ourselves from all accidents as far as is practicable, we cut off the supply.

4301. Take the Covent-garden subway; how long should you cut off the supply from the neighbours to put in a service pipe, will it be half an hour?—It may be about half an hour; but supposing there are parties wanting gas all the day in many cellars and areas, it is a great inconvenience, and they complain very much.

4302. How much do your mains supply in the street of Covent-garden?—Both sides of the street.

4303. Do they go beyond?—Not at present; we only use the main in that street simply for the requirements of the street.

4304. Is it large enough to go further?—No; if we are required to go further west we should have to lay an additional main there.

4305. Your main comes in from the east?—From the south-east.

4306. From the market?—Yes.

4307. Where does your other main go that supplies the west through King-street?—No, we have no other mains in that street at all; we supply from the Haymarket all the way up St. Martin's-lane.

4308. Is Long-acre in your district?—Yes.

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4309. Is that a thoroughfare for your mains, or only to supply Long-acre itself?—We supply Long-acre and that part.

4310. Does it supply other districts than Long-acre?—No.

4311. Your pipes are sufficient for what is likely to be built in the new street?—Yes.

4312. How many times have you repaired the pipes in Covent-garden?—Not at all, to my knowledge.

4313. You have had them down 2 ½ years?—Upwards of two years.

4314. And you have not repaired them yet?—No.

4315. Have you put in any service pipes?—Yes.

4316. How many?—I cannot answer that question exactly.

4317. I think you put your mains down before the houses were built?—Yes.

4318. And you supply every house that is built or is building?—Yes, as is required.

4319. And you supplied the lamps from the beginning?—We supplied the lamps from the beginning.

4320. Did your directors ask your advice when the Board of Works applied to you?—Yes; we had a discussion upon the subject, and we came to the conclusion that we would lay the mains upon the condition that we should be allowed to lay them in the soil as we do in the street; and we got that permission from Mr. Marrable.

4321. Your directors asked your advice, and were guided a good deal by it?—Yes; it was mentioned to the Board, and the thing was discussed.

4322. At that time did you see much objection to it?—I did; we saw some objections to it, and we would only lay them on condition that we should be allowed to bury them in the soil; but we did not wish to be an impediment to any improvement, and we were willing to try the scheme upon a small scale.

[The Witness withdrew.

Mr. *Charles Greaves,* sworn; Examined by Mr. *Holland.*

Mr. *C. Greaves.*

4323. ARE you the Resident Engineer of the East London Waterworks Company?—Yes.

4324. And have been so for several years?—Yes.

4325. Will you shortly state to the Committee the district that you supply?—The East London Water Works district is the most easterly part of London, which is from a little on the other side of the Minories and Bishopsgate, is the extreme east.

4326. *Chairman.*] Do you go into the borough?—Not at all, although we are at the north side of the Thames.

4327. Mr. *Holland.*] What mileage of pipes have you?—Four hundred and twenty miles of pipes altogether, at the close of last year.

4328. As to the danger of putting gas and water pipes together, have you examined the scheme of the subway proposed?—I have, thoroughly.

4329. Do you from your experience object to gas and water pipes being put together in the subway?—My opinion is decidedly adverse to either or both in any way.

4330. As regards the gas pipes, you no doubt agree with the last witnesses as to there being constant leakage from gas pipes either from the pipes or joints, and even of exposed pipes?—It is a matter of ordinary knowledge that there is a continual exudation of gas in some way from the pipes throughout the whole length.

4331. And one of those reasons is, from the neglect of the workmen in many cases in doing the repairs in the joints inefficiently?—It is, to some extent.

4332. Taking that as one of the causes, in your judgment, is it not more likely that the repairs will be less efficiently done by artificial light in the subway, than in the open air in a trench?—I do not know that it need be said that the repairs would be less efficiently done, because the superintendents of the company take care that the repairs are well done, but the operation would occasion more trouble, and it would be more costly.

4333. Do you apprehend the workmen would require higher wages for working in a subway, as compared with working in the open air?—I think most probably they would, but they can do less work at a time.

4334. As

4334. As regards the leakage of pipes, do not you apprehend that there might be considerable leakages, that the gas will get into the side passages unless there is a strong current of air down the subway in one direction?—There would be accumulations of gas in any parts where the circulation of the air does not quickly remove it.

4335. Is it not necessary that there should be, for the purposes of ventilation, a steady current of air always in one direction?—It is desirable that there should be a current of a air from the low points issuing at all the high points.

4336. In your judgment is the laying of pipes in the earth, a safer plan than laying them on chairs?—I think that the laying of pipes in the earth allows of the gas being absorbed to some extent, and not poisoning the air. One of the difficulties arising from the subway, would be the fear of the men going down.

4337. *Chairman.*] Is it found practically to exist?—Certainly.

4338. What is your means of knowledge of Covent-garden or Southwark subways?—We have such things as gas pipes of various sizes in covered places.

4339. You have no means of knowledge of the Covent-garden and Southwark subways?—There are two leaks of gas in the Southwark subway now.

4340. Is there any fear, practically, in a man going down now?—No.

4341. Mr. *Holland.*] I understand you to prefer that the pipe should be laid in the ground. You know that the promoters propose to lay them on brick piers or iron chairs?—I think so.

4342. As regards the temperature, it is the case, is it not, that the joints after the changes of temperature, especially frost, become loose and require inspecting?—I cannot say I have any particular knowledge of gas pipes on that subject; the cold chiefly affects the water pipes; the contracting of pipes from the cold weather is one of the principal causes of leakage.

4343. Would not a pipe laid on a chair, with a current of air passing over it, be much more exposed to cold than when laid in the earth, at a depth of two or three feet?—That depends altogether upon the condition of the ventilation.

4344. At what depth are your pipes laid?—We endeavour to obtain two feet of earth over the top of the pipes in all cases.

4345. Have you considered at all the cost of laying a water pipe in the subway, as compared to laying it in a trench?—Yes, I have considered that subject, because I think it is one of the principal points by which the minds of the Committee will be guided in this inquiry, and I should wish to say that it is a question rather of degree if one is to be deliberate in one's opinion; but, as a whole, I believe that the pipes will be more expensive to lay in the subway than in the ground, and the increase of expense will attach more to the large pipes than to the smaller ones; but that, on the whole, it is better for us to be in the upper surface, so far as the expense goes, than in the subway.

4346. Would one of the main items of increased expense be handling the pipes and carrying them up the subways to the place where they would be fastened, and arranging them there in their proper position?—The cost of laying large pipes in the subway would be very great.

4347. You have heard of the number of applications that have been sent in for opening the streets; have you got any account of the number of openings of the streets in your district in the last two years?—I am not provided with any number.

4348. Can you say whether it is the case that the greater majority of applications are for smaller jobs, and not for jobs that would necessarily disturb the traffic?—There is no doubt that the majority are of a very diminutive kind; a great many are not more than a yard square. We have had discussions with surveyors of parishes, whether we should be allowed to pay for anything less than a yard.

4349. A great many of the applications are for repairs of cock and plug boxes for fire services?—Yes.

4350. All those will have still to be worked on the surface?—I do not see any way of avoiding it.

4351. And, therefore, to a certain extent, there must be repairs of those cock and plug boxes on the surface?—It appears to me to be unavoidable; I do not see but that the cock and cock boxes and fireplugs must be brought to the surface.

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Cross-Examined by Mr. *Phinn.*

4352. We are confined now to four streets; two where the subways are actually constructed, and two where they are about to be constructed; did I understand you to say that you have formed any judgment as to the maximum size of pipes necessary in any of those streets?—Southwark-street is a leading street, and if it contains the larger mains, as streets generally do of that magnitude, I should imagine there would be large pipes in it, not only for local supply, but for carrying to distant parts of the district.

4353. Have you formed any judgment of the pipes necessary for the actual service of the street; did you hear what Mr. Innes said?—I was not here when he was examined; it is not a common way to carry a main into a street solely for the supply of that street.

4354. Should you think an 18-inch water pipe and two 10-inch water pipes enough for the service of that street and for the service of the streets beyond?—Yes, I should think so, so far as the pipes are required for such an important street as that.

4355. Would you take an 18-inch gas main and two 6-inch?—They might have to be laid through it, very probably.

4356. You have been down the Southwark subway have you?—Yes.

4357. Would that subway take, laid on chairs, an 18-inch water pipe and two 10-inch pipes, and an 18-inch gas pipe and two 6-inch, with facilities for working?—It would depend upon when you have an opportunity of putting them in.

4358. You had plenty of opportunity, because the houses are not built, and the subway is ready?—If you give such facilities as that, you may get them in.

4359. And having got them in, would they lay very comfortably there, with plenty of access?—The access would be rather confined.

4360. Just look at that (*handing a diagram to the Witness*): that is drawn to a scale, and we have taken Mr. Innes' own evidence; will not that represent actually the position of the pipes of the Southwark subway?—You have shown no cocks, no fire-plug orifices, and no communication pipes, right and left: going through these subways, when the pipes are in, would be crawling through a spider's web.

4361. There is the spiders' web you have to crawl through; you do not deny that that is drawn to a scale?—It appears to be.

4362. You would not bring, I suppose, all the protuberances on each pipe close together, parallel?—Certainly not; if the thing had to be done you would make the best of it, but at the best there is an inconvenience.

4363. If you try to prove it is not to be done, you will make as many difficulties as you can. Are you aware that the pipes are now actually down; you can go and see them if you like?—There was a 2-inch pipe when I was there.

4364. You have not been there lately?—Not within 10 days.

4365. Should you like to see it in actual operation as it is there; would you like to see the pipes better than the drawings with the boxes and all on?—I can imagine the works as well as if it were already made.

4366. Does your imagination and that diagram coincide?—This is bald; you have shown the smallest possible amount of work that could possibly be drawn to represent the pipes.

4367. Do we show the space the pipes would occupy?—There is an 18-inch pipe, and two inches of iron more.

4368. Could you put the joints round, not taking all the joints at the same point?—That is what the thing would practically be (*handing a plan to the learned Counsel*).

4369. What is this zigzag across here?—You must have a service pipe for these houses, and a service pipe for these.

4370. The black is the gas pipes, and that (*pointing to the plan*) is the water pipes?—And, for the sake of avoiding that, you have laid the pipes on each side of the street.

4371. That is your own witness's suggestion; we have taken Mr. Innes's own showing?—I admit that in a street of the magnitude of Southwark-street, such pipes as that would be likely to be required.

4372. Is it necessary for you to obstruct the gangway?—It is unavoidable.

4373. Why

4373. Why is it necessary to connect the two pipes with one another?—I will rub out this Bill here: but if your theory is that there is to be a main pipe on each side, it will be avoided.

4374. What, are these lines almost vertical?—Certain branches, certain connections, certain pipes going out to the other pipes; you must have cocks manageable from the street.

4375. A large water-main is not necessary for the service of a street, is it; it is for something beyond the boundary?—I imagine so; certainly, unless there were some large factories built there.

4376. Those connections you show upon that are not necessary for the service of the street, *per se*?—Until houses are built they will not require it; but you have a perfect liability to have tenants there requiring large supplies.

4377. That main was suggested by Mr. Innes, not for the service of the street, but for the service of something beyond the street; assuming it to be so, it is not necessary to have those connections you have shown with that, is it; those lines at an angle of 45 degrees?—I cannot imagine a street of that kind with mains through it, without including all the large mains required; a part of the system of waterworks is to interlace the pipes in all directions.

4378. If that is for districts beyond the street, is it necessary to have those connecting pipes with the street?—Certainly not.

4379. Why?—You do not want to send the pipes only from one end of the street to the other.

4380. Would the smaller waterpipes supply the street itself, the main being for places beyond the street?—In my system of waterworks you have a main nearly in every street.

4381. Do you have, in your system of waterworks, one large main for the street, and two smaller mains for a street, with connections with all of them?—Not if they are reserved for that street.

4382. Therefore that connection with a larger main is not necessary for the purposes of the street?—For the purposes of the street it is not.

Chairman.] I did not understand Mr. Innes to say that.

Mr. *Phinn.*] The larger main was not for the street, but for the purposes of the street.

4383. *Chairman.*] I understood Mr. Innes to say that they would require pipes from an 18-inch to a 10-inch pipe every 200 or 300 yards; would that be requisite?—Hardly so close as that; perhaps they would be necessary at intervals with one 10-inch over the other; the practice is to interlace the mains as much as possible; I would beg to lay before the Chairman a map of the connections in Whitechapel—that is the actual plan; you will have the same thing here; the street is equally an important matter.

4384. Mr. *Phinn.*] What is the largest pipe shown there; is the 18-inch pipe shown on this plan?—There is a 36-inch main comes right through; all the pipes are not shown there; all the waterpipes are there; the gaspipes are indicated by the red.

4385. I do not see the 36-inch main?—It is not shown, it has been put in since; the 36-inch main and the 26-inch main are through that street since.

4386. Are those large mains for the purposes of that street?—No.

4387. Do you mean to represent that in Southwark-street it would be necessary to have a 36-inch main?—It is quite possible.

4388. I ask you, will it be necessary?—In the change of things that is going on in London, such things are liable, and therefore we must meet a practical question of this kind with a view to preparation for them.

4389. When we are all dead and buried, such may be the case?—Ten years ago there was no imagination of a 36-inch main coming up Whitechapel.

4390. How near to your supply is the 36-inch main?—The source of supply?

4391. Yes?—Two and a half miles.

4392. What is that large main for: is it to supply something beyond this street?—It is a carrier main; but your subways must be large enough for carrier mains, if all the pipes are to be put into them.

4393. You have spoken about frost; did you happen to go to Nottingham; have you seen that system?—No.

4394. Have you been down the Covent-garden subway?—Yes.

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4395. We have had a sharp frost during this last winter: did you ask whether the frost had affected the water-pipes there?—There is no ventilation at all.

4396. Did you breathe there?—A man can breathe without ventilation.

4397. Do you mean that it was such an atmosphere as showed there was no ventilation at all?—If you had 10 men working down in that subway they would soon be in a tremendous heat.

4398. Did you take a thermometer?—I imagine the temperature was very much higher than what it was above.

Re-examined by Mr. *Holland.*

4399. By ventilation I understand you to mean the real and practical ventilation?—Ventilation implies a current of air.

4400. As to the frost: the Covent-garden pipes are laid in the earth, and you told us that the frost does not affect pipes laid in the earth so much?—No.

4401. I have not seen that plan, but there are no pipes there for the cross streets coming at right angles to the subway, because we have to account for them. Mr. Marrables suggests they should come through the subway?—It is a mere cross section, drawn in the wildest way.

4402. Therefore there are none of those pipes inserted?—No.

4403. Then when a fault is found with your plan, the only fault is that you have not put in a pipe that has been put there since?—Yes.

4404. Is it not practically the fact that there is an increase of pipes in all districts of London within a certain number of years?—It is the case in my own district, and, of my own knowedge; it is the case in almost every other; and it appears unavoidable.

4405. You have been through the Southwark subway; you know the class of thoroughfare. Is it not likely there will be an increase required for that district, when the houses are built upon both sides?—The site appears eligible for building.

4406. And therefore, within a year or two, it is quite possible a 36-inch main may have to be carried across there?—Yes.

4407. *Chairman.*] Have you calculated the houses that have been destroyed, and the houses likely to be built, and the quantity of water required in the houses?—I can but imagine that it must be a considerable sized main to be brought in there.

4408. St. Thomas's Hospital is gone, which would want a great deal of water?—Barclay and Perkins are there still.

4409. What is the new building that is being built there?—It is above; that street should be built in such a way that all pipes should be included.

4410. How does the water get along those old streets now?—I have no special knowledge of that.

4411. Is the subway quite sufficient for the accommodation of Southwark-street itself?—I should say it was.

4412. A new street is a great convenience to the companies?—In some cases it would be; the streets in Southwark, before the new streets were made, were very tortuous, and very narrow. No doubt the street is an immense improvement to the town at large.

4413. I am talking of the companies?—I am not aware of the special circumstances under which the companies stand; but they have no particular object in forwarding the water at the further end of the street; nothing is better than a straight street to carry the pipes through.

4414. Have you had a new street made in your district within the last eight or ten years?—Yes; the Victoria Park approach was entirely in our district; that was executed by the Metropolitan Board of Works, and is entirely in our district.

4415. Have you taken the pipes along that?—We have laid pipes along it.

4416. Were the pipes laid in the neighbourhood before?—In the neighbourhood they were; but the street, to a great extent, is through new ground.

4417. What I want to know is, whether such a new street as Southwark-street, in a densely populated neighbourhood, is a great advantage to the companies themselves in reference to laying their pipes?—The answer to that could only be given by a person having a knowledge of the boundaries that the companies supply.

[The Witness withdrew.

William Haywood, Esq., sworn; Examined by Mr. *Rodwell.*

4418. ARE you engineer and surveyor to the Commissioners of Sewers of the City of London?—I am.

4419. And as such, have you charge of the roads and pavements of the City?—I have.

4420. In the case of opening the pavements, have all applications by gas, water companies, telegraph companies, and others to be made to you?—They come through my department; the applications are made at my office.

4421. And the vouchers for the restoration go through your office?—Yes; they go through my office, and are given by my inspectors.

4422. How many gas and water company are there in the City?—Three gas companies, two water companies, and I do not know how many telegraph companies; every telegraph company has its head quarters in the City.

4423. Does that entail a greater number of openings in this district than any other part of the metropolis?—Proportionately to the length of the streets there are more openings there than in any similar length of street in the metropolis.

4424. Have these facts made you well acquainted with the alterations which from time to time become necessary in the distributing system of gas and water?—Yes; I have necessarily had my attention very much called to the reasons why the alterations are made, and the expense incurred by them.

4425. Have you given great consideration to the question of forming a subway for receiving the pipes of the various companies in the streets?—Yes; my attention has necessarily been directed to the subject, because the inconvenience which has resulted has forced it on me.

4426. I will more particularly call your attention to the system of subways in Paris; are you intimately acquainted with them?—I have visited a large number of subways in Paris.

4427. When did you last visit them?—I visited them at intervals for the last 10 years; the last time I visited them was Christmas.

4428. With whom did you put yourself in communication at Paris?—With a friend of mine M. Mille, who is one of the divisional engineers of Paris, and M. Belgrand, who is the chief engineer of Paris.

4429. And who else?—Those were the persons with whom I communicated.

4430. Did you see M. Dupuit?—He is no longer connected with Paris, but when he was connected, I was in personal communication with him, and also with M. D'Arcy, who was connected with the Municipal Service of Paris.

4431. The subways of Paris have been described to a certain extent to the Committee already; they consist of a space for the sewage to be carried, and also pipes are placed at intervals for the carriage of water?—There are some few subways which may be called strictly subways, and are constructed to hold pipes simply, but the majority of the subways in Paris fulfil the double object of carrying off the sewage, and providing space for the pipes; in fact, they may be more strictly called, large sewers, but constructed specially with a view to holding pipes. This plan which I hold in my hand represents very closely the different forms of construction of the sewers in Paris; and I think I may say that every one of the sewers, or almost every one that I see here, I have personally visited at different times.

4432. What is the system of ventilation in the subways in Paris; is it good, or bad?—Speaking of them as compared with the sewers of London, the ventilation is very superior; for this reason, that although they have but at few places ventilation directly in the crown of the sewer, yet every gully throughout the whole of Paris is a ventilator; the gullies in Paris are not trapped, but they have large lateral openings in the kerbs through which the water falls; and those communicate with cross subways, or branches communicating with the sewer, each of which is large enough for a man to walk upright in, or nearly so. The consequence is, that there is a larger amount of aperture in Paris than is provided in the sewers of London.

4433. The foul air escapes through these untrapped openings, I suppose?—Yes; but neither is the air of the Paris sewers so foul as the air of the London sewers. Persons are apt to imagine the contrary, but I am speaking of that which is perfectly correct, and there are various reasons why it should be so.

4434. Have you visited the subways in other parts of France besides Paris?—No,

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No, I have not; I have made inquiries as to them, but I have not visited them.

4435. Did you make inquiries, when you were in Paris investigating this subject, with regard to the opinions of the French engineers as to laying gas pipes in subways where water pipes were?—The whole of the engineers that I had conversation with upon the subject who are attached to the *Corps de Pout et Chaussées* are adverse to laying pipes in the subways or sewers.

4436. Do you know from those who are responsible for the safety of the subways that they set their face against it?—Yes; I had it from M. Belgrand himself, when I was with him at Christmas in some of the subways.

4437. What are the facts which have induced the engineers to come to such a decided opinion with reference to the danger of putting pipes in subways?—The reasons that were explained to me were these:—Some years ago, there was placed in a street called Rue des Martyrs a water-pipe, and also a line of gas-pipes, the length of which was something like 800 metres, which is about half a mile. I may mention that the Rue des Martyrs is not exactly that length, but it is continued through some other streets, and through a portion of the external boulevards; but the total length was 800 metres, which was laid in this sewer or subway. There was a very serious explosion there, and three men were killed. The men whose duty it was to work in the subway refused to continue their work, and the pipage was removed.

4438. Did you ascertain, or were you informed, in what way the gas communicated with the subway, or how it got there?—I was led to believe that it had escaped from the pipe in the subway.

4439. I presume that those gentlemen who gave you this information, M. Belgrand and others, had investigated the question themselves, and sought for the best information upon the subject?—I apprehend so for this reason, that I was informed that the Préfet had a decided desire to have the gas-pipes put into the subways, and had, of course, used all his authority, which is very great in a man placed as he is in Paris, but he had been resisted and strenuously opposed by the engineers in charge of the municipal service in Paris, and up to the present time successfully.

4440. Are you aware that there was another explosion in the Square of the Louvre?—Yes; there has been an explosion in the Square of the Louvre, but the sewer under the Louvre itself appears not to be under the charge of the General Municipal Service of Paris, but under the special charge of somebody connected with the Palace.

4441. Are there any pipes now in Paris laid in the subway?—I believe none, except in the Palais Royale, where they are laid in entirely different conditions.

4442. They are cases not at all analogous to the subways now before the Committee?—I believe not.

4443. Practically, then, the laying of gas pipes has been discontinued in Paris in consequence of the accidents that have resulted from laying them down before?—It was never prosecuted further than to the extent I have told you; and at the present time, even in the best streets in Paris and in the new streets that are being made, the pipes are laid exactly in the same way as in London, namely, beneath the surface of the pavement.

4444. The pipes are laid there, you say, as they are laid in London, though the subways of Boulevard de Sebastopol is large enough to admit of the pipes if it was thought desirable to put them in?—There is only one large gas main running through the souterrain of the Boulevard de Sebastopol.

4445. And that has been recently laid?—I think some four or five years ago the water pipe was first put into it.

4446. This view of the danger is not confined to Paris, but you find that at Dijon, Lyons, Bordeaux, and Toulouse, and other towns in France where subways exist, gas pipes are not laid in them?—The four towns about which I questioned M. Belgrand were Dijon, Lyons, Bordeaux, and Toulouse, and at all of those places they have placed no gas pipes in the subways.

4447. And in those subways there was capacity to hold the gas pipes if they thought it was to put them in?—I think from my recollection of all the places that I have seen and passed, that there was space enough; they were all large enough for a man to walk upright in; the French engineers are by no means given to minimum sizes in their construction.

4448. And the French engineers are not given to timidity, I believe; it is suggested that French engineers are more timid?—They are very careful, but I think, generally speaking, they are not more careful of their lives than we are. I do not think we can charge the French with a want of bravery.

4449. Do you know what is done at Brussels with reference to laying down gas-pipes?—In a report which was written by a person of the name of Versui, who held the same sort of employment that I do in London, he objected to the laying of gas-pipes in subways, though he advocated the subways for water-pipes.

4450. What was the ground of his objection?—He objected on the ground of danger.

4451. And in Belgium generally are the engineers or the authorities of the city adverse to having gas-pipes laid in the subways?—I cannot answer you with any precision upon that point. I can simply speak to what took place at Brussels. In all probability, I might say not; but I have no information upon it.

4452. What is your own opinion, after having visited these places, and having had the experience you have in London with reference to gas and water companies; what is your view with regard to the practicability or safety of putting gas and water pipes together in a subway, as proposed by the Metropolitan Board of Works?—I think there will always be a large amount of danger. I think the danger may be reduced beyond the danger which I see in the subway which is constructed here. In fact, I look upon it as only a question of time; but there is sure to be an explosion.

4453. You think it impossible that any precaution can be taken to obviate an explosion at some time or other?—I fear not. I say I fear not, because I am very sorry for it. I wish a system could be devised to relieve the danger.

4454. Being in your position, you are well acquainted with the inconvenience of taking up the pavements of streets from time to time, and you would be glad to advocate and support any system, I suppose, that would do away with that?—I should indeed.

4455. But with your strong wish, you cannot see your way to do it with the scheme at present devised?—It could be reduced, but not entirely relieved. Some years ago I went closely into the question of ventilation of sewers; it was a difficult and complex question, and I must say, that there is a great analogy between the necessities of subways and sewers with respect to ventilation; and though I believe I helped to annihilate any system that had been proposed, I was not able to propose anything in its stead.

4456. At present, we must deal with that plan with which you are familiar, and you say that the danger might be modified, but do you think that great danger would arise by adopting the system proposed on that plan by the promoters of the Bill?—Those side passages are entirely deficient in ventilation. I assume that they would be entirely deficient of ventilation when the services are laid on to the houses. Where there are services at this present moment, there are, what we call in sewer language, "dead ends;" there is no ventilation in them.

4457. Do you know that explosions of gas have taken place in sewers very continually?—Yes; the explosion of gas in sewers has been very frequent indeed, and lives have even been lost by it.

4458. *Chairman.*] From what sort of gas?—Not by the gases generated by animal decomposition, though explosions have taken place from that gas. I have myself been in a sewer when it has been fired with explosions from the common coal gas; they are very frequent indeed. I should say several occur every year in London at this present moment.

4459. You know that they take place?—I know that they take place.

4460. Mr. *Rodwell.*] Have you any return there which shows those explosions?—I have not one here, but I know that every second year at least there is an explosion of coal gas in the city sewers alone, sometimes trifling, and sometimes serious. I never heard an Inspector or Clerk of the Works of the Sewers who had not been burnt; some of them were very simple burns, but there was an explosion.

4461. How did the gas get into the sewers?—It is very difficult to tell you, because I can only speculate upon it. The probability is, that it came in from some adjacent main, and in some cases it comes in through such a thing as a ventilating shaft, or a side entrance, or a gully.

4462. Is it possible that the gas might find its way into one of these subways, and accumulate there?—Certainly.

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4463. And that is where you apprehend the danger?—Yes.

4464. An explosion in a subway would be something of a terrific character, I suppose?—Of course; it depends upon the quantity of gas whether you are blown to atoms, or only lose your whiskers. I was once very nearly in an explosion myself, and we were obliged to put our lights out and find our way out as best we could. That was from coal gas; that occurred in the City.

4465. Have you made a calculation of what either the mechanical or special ventilation of the sewers of London would cost?

Mr. *Phinn* objected to the question.

The *Chairman* stated that the question could not be put.

4466. Mr. *Rodwell.*] Have you considered the question as to how far the laying of pipes in subways would be a saving to the companies?—I do not think it would be a saving to the companies.

4467. Not under the present Bill, at all events?—Not as I understand it; it would be a great loss. Of course, I do not know what arrangements must be made.

4468. Supposing they pay no rent?—If they pay no rent, and if they have to pay for the maintenance of the subways, do you mean? because the subways, when there are gas and water pipes, and probably the wires of the telegraph running through them, ought never to be left. You must have a watchman there night and day; you must have competent people to supervise the workmen, and the supervision in a subterranean construction of that sort is infinitely more difficult than on the surface. There ought to be competent, and, if I may use the phrase, highly respectable watchmen night and day. You may be subject to malicious damage as well as everything else.

4469. Do you find from your experience of sewers and underground works in London, that danger is likely to arise from malicious damage?—We have plenty of malicious damage in the sewers; it is thievish damage, they steal and rob.

4470. Mr. Simpson told us how fond the people are of stealing lead?—I think I am really within the mark when I state that in the sewers we have had 1,000 or 2,000 gully-flaps and valves placed at the mouths of drains broken and stolen. We have had the lead faces of flushing-gates cut out of the stone. We have had even the flushing-gates broken to pieces for the sole object of getting out the small quantity of lead; I have known a damage of 6 *l.*, or 7 *l.*, done for the sake of getting something worth 9 *d.*, or 1 *s.* The subway must not be left night or day. There is nothing to prevent the lowest class of thieves getting into them, unless there are watchmen there night and day; and if they go into the sewers, they will go into the subway, if there is anything to steal.

4471. There will be the iron and lead there which they can steal?—They will find something to dispose of.

4472. Taking into consideration that the management is expensive, and the maintenance as well, do you think that would entail a large annual expense on the companies who might think fit to avail themselves of the subways?—My impression is, that labour would be naturally expensive in a place where they must work with artificial light; it is a well-known fact, that wherever artificial light is employed, labour is more expensive; the men do less in a given space of time, the ventilation is bad; I cannot suggest a better ventilation for it. I really cannot say whether the companies will be benefited, in a pecuniary point of view, or not, but my impression is, that they will not; the utmost they can save is the expense of opening the pavement and ground. Against that is set the loss of labour in working in subways by artificial light, and the painting of their pipes once in six months, perhaps.

4473. Do you know that in Paris the labourers in the subways are paid much higher wages than the labourers above ground?—Looking to the unskilled labourers they are; I do not know whether the unskilled artizans are, or not.

4474. I talk of the labourers who work with the lamps?—There would be much more physical exhaustion in working in a subway.

4475. The men would have to live better, I suppose?—They would perspire much more. You have only to walk through the subway from one end to the other, and you will find a vast difference between that and the open air in the physical exertion that is requisite. I went through the subway in Southwark the other day, and when I came to the upper end, I was covered with a cold perspiration, though it is drier than I expected.

4476. With regard to the public convenience which it is stated will result by the

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the introduction of pipes in the subway, will it be so great as to justify the expenditure which is proposed?—That is, to my mind, a very wide question. The condition of the supply of gas and water to the metropolis is somewhat different to what it was years ago, because the gas companies are districted. I think there will be fewer openings than there have hitherto been from that fact; the competition has ceased, and they are placed in certain districts, and I apprehend that will result in fewer openings of the surface than have hitherto been rendered necessary. If the expense is to be thrown upon the ratepayers, of constructing this subway, it is a great question to me, looking at it commercially, whether it would be a benefit. But the inconvenience of opening the pavements is patent to everybody; it is very objectionable to see the pavements taken up: that cannot be denied; but at the present moment I do not see my way to using the subway, but the existing expenditure for the restoration of the pavement is much less than some people would imagine. I have taken out an approximate cost of the restoration of the pavements for last year in the City for the gas, water, and telegraph companies. Now last year, I may mention, was an exceptional year, so was the year before last.

4477. It was exceptional in what way?—The openings were more than had been for many years previously; the water companies had re-laid a considerable length of main, and I find that the cost of the relaying for all purposes was about 41 *l.* 5 *s.* per mile, that is, taking all classes of streets. This is the actual condition in front of the Mansion House at the present moment (*producing a plan*).

4478. This included the gas, water, and telegraph companies?—Yes.

4479. Did you give the average of the last two years, or what?—It was the average of the last year; the total sum of money paid to the paving contractor last year was 1,980 *l.*; the year previously, it was 1,583 *l.*; and the year previous to that 1,749 *l.*

4480. For how many miles was that?—The mileage in the City is from 45 to 48 miles; I forget exactly what it is.

4481. Each of these companies have pipes?—Yes.

4482. And this included everything?—Yes; all the cost for re-laying for all purposes during that year.

4483. You have not gone into an estimate yourself, of the cost of forming these subways, or laying and re-laying the pipes?—Not the cost of re-laying the pipes; I only have a certain knowledge which a person like myself must have.

4484. Bearing those figures that you have given me in your mind, and applying your experience of the cost of relaying and the cost of the subways, would not the expense be far more, in your opinion, if the subways were used, and the pipes were re-laid, as proposed by the Metropolitan Board of Works?—I think that arrangements may be made which will much mitigate the objections as compared with what I see there. For instance, I think I should feel inclined to go to the expense of putting a tramway down myself.

4485. For what purpose?—To move tools and pipes about, and to move earth and material out of the sewers. I believe that will be done sometime or other; but of course it will very much increase the expense, and will therefore raise the question you have put to me in a far higher degree where it is part of the outlay.

4486. Supposing the subways to be authorised, do you think they will have to be enlarged at a future time?—I think so. I have no definite scheme of subways in my head; but having given the subject attention, and seeing what is done in Paris, I believe that great improvements may be made upon that subway, and I also believe that the Board of Works will make the improvements; but of course it will very much increase the expense. I never thought that subways could be constructed under something like 25,000 *l.* a mile, and I do not think so now.

4487. Enlarging subways is a most expensive process, and takes a coniderable time, does it not?—I have not thought of that point; but at the present moment it strikes me that they would have to be re-constructed entirely.

Cross-examined by Mr. *Phinn*.

4488. What made you go to Paris to pay this visit?—I went for pleasure.

4489. When did you go?—At Christmas.

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4490. With any view towards subways?—When I am at Paris I try to get the most recent experience of everything connected with the profession that I follow.

4491. Have the City got a Bill in Parliament this year for the improvement of Holborn Valley?—Yes.

4492. Have they taken powers to construct a subway there?—Yes.

4493. Is not that under the Commissioners of Sewers?—Yes, if constructed.

4494. And you are their officer?—Yes.

4495. Were you consulted with reference to the construction of this proposed subway?—The Holborn Valley scheme is my own design.

4496. Was it part of that design that there should be a subway?—There is no design for a subway in the scheme, but as the construction of the viaduct will render some provision necessary, and, inasmuch as the construction of subways has been generally under the consideration of the public for many years past, I thought it was highly expedient that the Bill should not pass into a law without, at least, the power be given to the corporation to construct them, if they thought fit to do so.

4497. Did you show any proposal of your own for a subway?—I did not; on the contrary, when I was examined by the Committee upon that subject, I told them that I had no definite views upon the matter; that I had not determined by any means to construct a subway there, but I should see what was right and make up my mind at a proper time.

4498. Did not you actually give a sketch to the Committee of the proposed subway?—To the best of my belief I did not, but if I did it was to this extent, that here was a mode of constructing a subway which would enable me to make a proper estimate, but I pledged myself in no respect.

4499. Did not you, within the last two months, show a Committee of the House of Lords a sketch of a subway?—To the best of my belief I did not.

4500. Have you got a sketch?—I believe I had one.

4501. Where is it?—It is not in existence.

4502. What has become of it?—I dare say it is destroyed.

4503. Was it not within the last six weeks that you were before a Committee of the House of Lords?—It is within the last six weeks.

4504. Cannot you recollect the circumstance?—I feel sure it has been destroyed.

4505. What is your ground for that belief?—Simply because all general sketches are destroyed when they are done with.

4506. Was it drawn to a scale?—Yes; I think it was drawn to a scale.

4507. Of what dimensions was the subway?—I cannot recollect.

4508. Can you tell me whether it was six, eight, or ten feet high?—I cannot.

4509. Can you say whether it was twelve or twenty feet wide?—I cannot; there were several made.

4510. As the engineer to this proposed street, you cannot tell us, for the information of the Legislature, what the dimensions were?—No; to the best of my belief that sketch was never produced at all; and, now I come to think of it, I am sure it was never produced at all.

4511. Had you got it there?—I never had it there, because I recollect at the present moment that I was questioned upon it, and I told them that I had no definite views upon the matter, but that I had got a sum of money to cover it in my estimate, and that was all.

4512. What sum of money had you got?—I have no notion at all.

4513. You had given your estimate within the last six weeks before a Committee; surely you can tell me what it was?—I think I gave an estimate for the whole of the works, and nothing else.

4514. Did not you state in the estimate that it was an estimate for the subway?—Yes.

4515. What was the estimate?—I cannot tell you; in all probability it was not estimated separately from the general work; there might have been a lump sum put down for it.

4516. Do you mean to say, that in your mind you believe that you made no estimate of the subways distinct from the general expenditure for the works?—To the best of my recollection, I did not.

4517. Have you, in your Bill, sought any powers to tax the Gas and Water Companies?—No.

4518. Are

4518. Are you quite sure of that?—I am quite sure. There is the usual clause, which I think has been copied from some existing Act, most likely from the Metropolitan Board of Works Act; but we have no power to compel the Gas Companies.

4519. I ask you whether you propose to take money for the use of the subways?—Yes; I think you will find that is the case.

4520. From both the Gas and the Water Companies?—I think there is a general clause in the Bill.

4521. That was drawn subsequent to your visit to Paris?—That was drawn before my visit to Paris.

4522. But it was maintained afterwards?—Yes; we sought to get as much power as we could.

4523. Last year, did the Metropolitan Board of Works take powers to construct subways in the City?—Yes.

4524. Did you, the Commissioners of Sewers, try to get the control of that subway?—Yes.

4525. And you failed, did not you?—Yes.

4526. What did you want to control for?—Simply because we wished to prevent the Metropolitan Board of Works from absorbing local powers. The Commissioners of Sewers have, up to the present time, the control over the physical conditions of the City, and we naturally wished to retain that control; we did not wish the Metropolitan Board of Works to have it.

4527. But the Metropolitan Board of Works got it?—Yes, they did; they beat us.

4528. But, if you had got the subways, what use did you mean to make of them?—That was for future consideration; most likely to put the gas and water pipes in them if we could.

4529. Did you give evidence before that Committee?—Yes.

4530. Did you say one word against putting gas and water pipes into the subways?—No; it was not the proper place to have said it.

4531. Had you an opinion against it at that time, or had you doubts about it?—I had exactly the same doubts that I have at the present time.

4532. Are they doubts, and not an adverse opinion?—The bent of my evidence to-day is what my opinion is; I have grave doubts as to the possibility of ever ventilating subways, so as to prevent explosions.

4533. That is with reference to gas; do you object to use the subways for water?—I do not object to use the subways for water.

4534. Do you think it would be a good thing to have the water pipes put in the subways?—Anything is a good thing to prevent the opening of the pavements.

4535. Do you think it would be a good thing to put water pipes into subways?—I think that the public convenience would be benefited by placing them in the subways.

4536. Do you think it a good thing to put electric telegraph wires into the subways?—The same answer must be given to that.

4537. Do you think it would be a good thing to put gas pipes into them?—Yes; provided it can be done safely.

4538. Would not the public be gainers by doing so?—The public would be gainers by every hole that is not open in the public highway.

4539. Do you think the public would be losers?—I have hesitated to express a fixed opinion upon that point; I think the balance will be against economy, that is to say, that the gas and water companies, or whoever have pipes there, will not gain by having them there.

4540. Do you think they will be losers?—I have already told you that I have not any very definite views upon that point; I cannot answer that question very closely, but, of course, if they are not gainers they will be losers.

4541. I do not see that that follows; they may be only balanced?—He must be a clever man to balance it so closely.

4542. Is there a great deal of breaking-up of the ground for the telegraph companies, or, do they carry their wires above the houses?—Some do, but the majority are under the footways.

4543. You have not given the breaking up, including the electric telegraph companies, have you?—There has been a considerable amount for some years past.

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4544. There have been more electric telegraph companies established, I suppose?—Yes; there were not so many openings for the electric telegraph companies last year.

4545. You told us something that startled me, that you had hardly an inspector of works that had not been burnt, and that there are constant explosions of gas in the sewers. Will you give me by Monday a return of all the explosions of gas that have taken place in the sewers under your jurisdiction for the last five years?—I do not think I can, these simple explosions are not much heeded. I alluded in the answer I gave to the inspectors of sewers, and not to the inspectors of other works; the inspectors of sewers are limited in number.

4546. Can you give me an account of the serious explosions?—I think I can obtain it for you.

4547. I want an account of the explosions for the last five years?—I think I can obtain it for you, but I am not certain.

4548. From what office?—Generally speaking, I have a memorandum myself of those things.

4549. Are they reports which have been made to you by the inspectors?—They are sometimes verbally reported to me by the inspectors, and the serious ones have at times been reported to the Commissioners. When I say serious ones, I mean where they have occasioned loss of life or serious damage.

4550. Or injury to the works?—Or injury to the works; that I must tell you is not of common occurrence.

4551. How many inspectors of sewers have you got?—One, and a sub-inspector.

4552. How often has he been burnt?—I think he has been burnt once.

4553. How long has he been with you?—I think he has been with us for five or six years.

4554. Are you sure of that?—I am almost sure of it.

4555. How many sub-inspectors have you got?—Sometimes we have one, and sometimes two.

4556. What is the maximum?—Two.

4557. How often have they been burnt?—I cannot tell you.

4558. Have either of them been burnt?—I think one has.

4559. You think one inspector, and you think one sub-inspector?—Yes.

4560. Is that what you meant to convey to the Committee by your evidence-in-chief, that you had hardly an inspector that was not burnt?—The clerks of the works are species of inspectors.

4561. How many clerks of the works have you?—Two at the present moment.

4562. How often have they been burnt?—One has been burnt I think twice.

4563. Now we have an inspector, one sub-inspector, a clerk of the works, and you think that each of them has been burnt; are you prepared to say that you believe that each or all of those gentlemen have been burnt by explosions of gas in the sewers?—Certainly, I have said so, and I am at once prepared to say it again.

4564. Can you fix the time when that occurred?—No; I cannot fix the time.

4565. It is such a trivial matter that you cannot fix the time?—Sometimes it is trivial, and sometimes it is severe; but you would be able, by referring to the records of the Metropolitan Board of Works, to find a great many records.

4566. Do you say that advisedly?—Yes, you will find the records of them; and I believe there is a book in the room which will tell you; I have a list of the explosions, that I can read to you.

4567. What are you reading from?—From a report written by William Haywood.

4568. That is the present witness, yourself?—Yes.

4569. When was that written?—In the year 1858; it is a printed document.

4570. Who was that report made to?—To the Commissioners of Sewers for the City of London, and it is entitled, "A Report upon the Ventilation of Sewers."

4571. What part do you wish to refer to?—I do not wish to refer to it at all, only if you doubt the explosion in the sewers, I will give you a list of them. I am not referring to the City alone, but to matters that have come into my own cognizance,

cognizance, strictly speaking, and matters as to which I obtained information at the time I wrote this report, which had nothing to do with the question of subway. "In 1850 an explosion took place in the sewer in Back Gravel-lane, Pimlico, and one man was injured." Where I got this information I cannot tell you at the present time. "In 1850 an ignition of sulphuretted hydrogen took place in Paternoster-row sewer. In 1850 an explosion took place in Petticoat-lane. In 1851 an explosion of coal-gas took place in Duke-street, Aldgate, and one man was burnt. In 1851 an explosion took place in Fore-street, and two men were burnt. In 1851 an explosion of coal-gas took place in a sewer in Broad-street. In 1852, by the ignition of sulphuretted hydrogen in an ancient sewer in John-street, Minories, two men were injured. In 1852 a similar ignition took place during the exploration of an ancient sewer upon one side of Coleman-street. In November 1852 two men were killed by entering an unventilated sewer in Compton-street, Clerkenwell, owing to the presence of large quantities of sulphuretted hydrogen. In 1854 an explosion of coal gas took place in the sewer in Castle-street, Holborn, and a man was burnt. In 1854 two similar explosions took place in the Threadneedle-street sewer. In 1855 two similar explosions took place in the Milton-street sewer, and a workman was burnt upon each occasion. In 1855 an explosion of gas took place in a sewer in Brompton-crescent, Fulham-road. In July 1855 two of the officers of the Metropolitan Court of Sewers narrowly escaped suffocation whilst engaged in surveying the sewer in Suffolk-street, Southwark. On 1st of November 1855 two flushing men, whilst traversing the sewer in Suffolk-street, Borough, were burnt by an explosion of gas. In 1856, an explosion of coal gas took place in the William-street sewer, and one man was injured. In August 1857 three men were suddenly killed by an escape of carbonic acid gas from a drain into a sewer constructing in the Whitechapel-road."

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4572. In any one of those sewers was there a pipe conveying gas?—I do not know.

4573. In your own jurisdiction is there a single pipe laid through a sewer conveying gas?—Through the appliances of the sewer undoubtedly.

4574. Through the sewer, I say?—I am not aware of any one. They cross transversely the crown of the sewer in some cases, and in many cases they go through shafts constructed like ventilating shafts, and in many cases they go through gullies, but there is not one that goes directly through a sewer that I am aware of, but I cannot carry the conditions of fifty miles of sewers in my head.

4575. These explosions are from gas that has permeated through the soil, and found its way into the sewer?—Either through the soil, or else escaped through the joints of the pipes where they go through the ventilating shafts or gullies.

4576. In going through the ventilating shafts, the gas would ascend?—I am not so sure of that, but the natural tendency of the gas is to ascend, but I should not be surprised if it drifted in another direction; it is drifting at the present moment from one of your subways; I was in the subway a week or 10 days ago.

4577. Which subway was it?—I was in both.

4578. Which subway have you found the gas drifting through?—There was a distinct smell of gas in the crown of the subway in Southwark, close to the pipe which crosses the subway transversely.

4579. What day were you there?—I cannot tell you; I am not able to tell you the day.

4580. Was anybody on our behalf with you?—Yes; I should not have thought of going down without some one; there was the foreman with me.

4581. Did you call his attention to it?—He heard my remark, and, I think, there was a witness, who has just left the room, Mr. Greaves, who was with me, and smelt it.

4582. You smelt gas there?—Yes.

4583. At what part?—It was in the head of the subway. There was at one point a pipe; I do not know whether it was a gas or water pipe, but my impression is, that it was a water pipe which crosses the subway transversely; the outer surface of the pipe was visible, and there was a distinct smell of gas at that spot: I was about, somewhat injudiciously, to put a light to it, when the man who was with me stopped my doing it.

4584. What man?—A man who was accompanying me; a person of the name of Haslet.

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4585. You went to Paris, you say?—Yes.

4586. Are you a pretty good French scholar; do you speak French?—I do not profess to be a good French scholar.

4587. Did you understand Mr. Belgrand to be a municipale, or a corps des ponts et chaussées engineer?—Both.

4588. Is he employed by the Government?—By the municipality.

4589. Did you find that the gentlemen you mentioned, M. Louis, or M. Dupuit are in the municipale or imperial service?—I do not know who M. Louis is.

4590. But you mentioned M. Mille?—Yes.

4591. Is he on the municipale?—He is one of the sub-engineers of Paris; he holds the appointment of district engineer under M. Belgrand.

4592. And M. Dupuit?—I have not seen M. Dupuit for some years; he was at one time either the chief or sub of the municipal service of Paris.

4593. And M. D'Arcy?—He holds a similar appointment under the municipality, and he was, or is now, one of the general inspectors of the corps des ponts et chaussées.

4594. You spoke of his complaint in the Rue des Martyrs; whereabouts is that?—The Rue des Martyrs is in the Notre Dame des Lorette, it goes out not far from the church, it begins there and terminates on the Boulevards.

4595. It is on the north side of the Seine, is it not?—Yes.

4596. *Chairman.*] On what Boulevard does it come?—On the external Boulevard. (*The Witness explained the position to the Committee*).

4597. Mr. *Phinn.*] Did you distinctly gather from Messrs. Belgrand that it arose from the pipe through the sewer, and the escape of gas through the soil?—It arose from the escape of gas from the pipe.

4598. Which was carried through the sewer?—It runs through the whole length of the sewer.

4599. Did you go into the sewer?—I did not go into the sewer; but I must tell you that the pipe is no longer there.

4600. Was there any report, or was this a mere conversation that you have been speaking of?—It was a conversation.

4601. You have no written report of the circumstances?—No; but I have a written letter from Messrs. Belgrand.

4602. Was there any formal report of it?—I believe it has been reported in the provincial French journals.

4603. Can you give the date when that took place?—I cannot.

4604. Did you hear Mr. Bramwell's evidence?—I heard five minutes of it.

4605. Have you read his evidence?—I have not read it through, but I have glanced at it.

4606. Did you hear Mr. Heman's evidence?—The same remark applies to his evidence.

4607. Did you gather from their evidence that they had inquired into these explosions, and could only trace two?—I did, and I was extremely surprised to hear it. I have a letter from Monsieur Belgrand here; a portion of the information was given by Monsieur Belgrand in Paris, and I believe I was actually in the sewer when he gave it me.

4608. Mr. *Phinn.*] Do you know that they have brought Monsieur Belgrand over to this country?—I do not know that, it is the first I have heard of it.

4609. Are you aware whether he is in this country?—I am not, but I should imagine not, or else he would have called upon me.

4610. Did you get the length that the pipe was laid?—Eight hundred metres he told me.

4611. Did you gather from him what the extent of the explosion was?—No, only that three men were killed.

4612. Where were they killed?—In the Rue des Martyrs where the pipe was laid.

4613. Did the explosion take place under the ground?—The explosion took place in the subway, and the men were in the subway when they were killed.

4614. In the Rue des Martyrs anywhere near the Rue de St. Honoré?—It is north of it.

4615. Your cannot give us the date of this occurrence?—No.

4616. I want

4616. I want to know whether we are talking of the same explosion as Mr. Simpson spoke of?—I do not know.

4617. Do you know whether you speak of the occurrence that Mr. Simpson spoke of which occurred 12 years ago near Montmartre. I think you must be speaking of the same occurrence as Mr. Simpson spoke of?—I cannot tell you, because I have had no communication with him upon the subject.

4618. Did Monsieur Belgrand mention any other explosion?—He mentioned that, and the one in the square of the Louvre.

4619. When did that occurrence take place?—A few years ago; I had nothing more particular than that.

4620. You do not refer to the occurrences that Mr. Bramwell and Mr. Hemans spoke of, do you?—I fancy not, because I think I heard you say that that was near the Marché de Saint Honoré; it cannot be that, because the square of the Louvre is a considerable distance from that.

4621. That was not enumerated as one of the explosions?—No.

4622. Did you go into the Boulevard de Sebastopol?—Yes, I did.

4623. How did the water pipe get on there?—It leaks considerably.

4624. I suppose it does not leak more than it would any where else?—Both gas and water pipes leak.

4625. Did you find any objection to the laying of water pipes in the subway?—I found no objection.

4626. You do not consider their subways equal to ours, do you?—I do indeed, in all the detail of them.

4627. Do you think that the pipes being open in the sewer is a good thing?—I see no objection to it; there is economy of labour, and you are sure to see every obstruction and all the leakages run rapidly off; there are bridges provided by which people can cross the sewer when opened, and there are travelling machines on the edge of the sewer, which practically forms a tramway, so that the men wheel up and down it, and can by that means shift the pipes and materials easily. I should say that in the details their subways are superior to anything that we have in England.

4628. Do you like the sewer being opened?—That is one of the points that I have not made up my mind about. I can see that there is economy of labour managed as things are in Paris, and they are enabled to apply manual labour and cleanse the sewer in a superior way to ours in this country; there is no sulphuretted hydrogen to any extent in the Paris sewers, and they are kept beautifully clean. It is a strong statement to say that there is none in the Paris sewers, but those that I observed are kept very clean.

4629. I find that half of the explosions you spoke of here, or nearly from the year 1850, were occasioned by sulphuretted hydrogen?—It is perfectly true in some cases; but I read to the Committee simply the explosions that occurred from coal gas. I did not read to the Committee any explosions which were due to sulphuretted hydrogen.

4630. There were a great many due to sulphuretted hydrogen?—Yes, but they are not only in the city sewers.

4631. But they are in the sewers of the city of London?—Yes, and in the surrounding districts; I see the term used here is ignition of sulphuretted hydrogen; I suppose I had some reason for using it.

4632. That is a very dangerous thing, is it not?—Yes; but it is not so explosive as gas, nor so dangerous it its results. In a sewer which is stagnant and which is neglected, you may set fire to the sulphuretted hydrogen, and you can see it run along the surface of the water and burn off, but you cannot do that with common gas, because it will explode bodily.

4633. May I take it that the result of your evidence is that yours are not adverse opinions, but grave doubts?—Grave doubts as to the possibility of ventilating subways so as to make them perfectly safe for gas pipes, and I think a great deal more might be done in relieving that.

4634. Do not you think it necessary, if you are to have those subways, and we are to go to the expense of them, that it must be a compulsory power to make the companies come into them?—I think that subways should have a fair trial; I think it would be unreasonable to compel persons against their will to use them and pay for them, and incur all the risk of them; but under some conditions I admit that I think it should have a thoroughly fair trial.

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4635. Perhaps you will give me an answer to a question which Mr. Simpson could not. If we are not to have compulsory powers, how are we to make the experiment?—You may make it yourself.

4636. But we have no power over the gas or water pipes; I do not think that the gas and water companies will thank you, if they are to have a rival gas and waterworks?—No; but the placing of gas pipes and water pipes in the subway will end in the Board of Works desiring to take the gas and water companies themselves.

4637. Do you think it possible to make a fair experiment without compulsory powers, under certain conditions?—Under certain conditions, I think the system should be fairly tried.

4638. Can it be done without compulsory powers?—I cannot see how it can.

Re-examined by Mr. *Richards*.

4639. You think there ought to be compulsory powers, and that the company should be taxed?—I do not think it a fair thing that a company, or any single body, should be compelled to use a thing whether it likes or not, and pay for it whether it likes or not, and run the risk whether it likes or not.

4640. I understand you to think, that if any accidents do occur from the use of the subways it would not be fair or reasonable that the companies should stand the damage arising therefrom?—That is a question that I have not closely considered. I think that subways should have a fair trial; I think it wise to try them, to a limited extent; and you should carefully abide your time to see what the results are before any large extension of the system is made.

4641. With regard to the subway in the Holborn Valley Bill, are there any compulsory powers in that?—No; nor is it by any means certain that it will be made; but if it be built under the viaduct, it will be a matter of necessity, because it will be a brick construction, and there will be the least possible room between the heads of the arches and the surface of the roadway; provision must only be made for the laying of the pipes to the houses; but I have heard of a system in the Palais Royal, and think that the system adopted there is very probably the one which, if I carry out the works, I may adopt for the Holborn viaduct, that is an entirely different construction to this; it is a trench that the men cannot descend to; they must open the paving stones at the top, and there is no earth to throw out.

4642. Do not you think that the companies who are compelled to use the subways should do so at the risk of the Metropolitan Board of Works?—I do not know that they should be compelled to do it; but unless they have some responsibility they might be careless; I have not made up my mind to that; I think as against their will, and at their cost, and at their entire risk, it would be unfair to compel them to go in; I think some equitable means might be adopted.

4643. With reference to M. Belgrand, there is no doubt of his being opposed to the introduction of gas pipes into the Paris sewers?—No.

4644. The Paris sewers are in your opinion equal in construction to the proposed subways, are they not?—I think those large sewers which are similar in size and construction to that which I see before me, are quite equal to them.

4645. They do not carry the house drainage of Paris, do they?—To a limited extent they do.

4646. That would account for the Paris sewers not being so foul as those in London?—The fœtal matters are nominally kept out of the sewers; in everything in Paris there has of late years been incredible care bestowed; I think to every three-fourths of a mile, or thereabouts, of the Paris sewers, there is one labourer, and the consequence is that there is something like 350 labourers always employed cleaning the sewers of Paris.

4647. Do you consider the ventilation good?—The ventilation is quite equal to ours, because every gully is a ventilator.

4648. And, notwithstanding that, explosions have taken place?—In particular spots; I know nothing about the special ventilation of the Place de Louvre.

4649. The gas pipes are not laid down there?—Most emphatically not.

4650. *Chairman.*] What is the size of the sewers in Paris?—They are rather larger than this which is proposed here; they vary exceedingly, but nearly the whole of the Boulevard de Sebastopol is nine feet high.

4651. This

4650. This is the main *souterain*?—It is 11 feet nine exactly. (*Pointing to the plan*); but you will perceive that the shape is one which very much favours it. I am not at all advocating this form of construction, but in answer to the questions of the learned counsel, I pointed out one of the advantages decidedly, and that is that the sewer or basin has a tramway on the edge of it, and there is a footway on each side. There are some of them which are much larger than this; but as a rule the footways on each side of these sewers are two feet six in width, and the form of the structure is such that a man of my height can walk quite at the side without hitting his head. *W. Haywood*, Esq. 27 May 1864.

[The Witness withdrew.

[Adjourned to Monday next, at Twelve o'clock.

Lunæ, 30° *die Maii*, 1864.

MEMBERS PRESENT:

Mr. Du Pré.	Sir Baldwin Leighton.
Mr. Floyer.	Mr. Powell.
Viscount Grey de Wilton.	

SIR BALDWIN LEIGHTON, BART., IN THE CHAIR.

Mr. *James Muyr*, re-called; Examined by Mr. *Smith*.

4651. YOU were asked for some Returns on Thursday last?—Yes.
4652. Do you now produce those Returns?—Yes (*the same were delivered in*).
4653. Are those Returns verified by your signature?—They are. Mr. *James Muyr*. 30 May 1864.

[The Witness withdrew.

Monsieur *Marie Francois Eugène Belgrand*, sworn; Examined through an Interpreter by Mr. *Vernon Harcourt*.

4654. I BELIEVE you are Engineer in Chief of the Ponts et Chaussées?—Yes.
4655. And have also charge of the service of water and gas, and also of the sewers of the city of Paris?—Yes, I am employed in the Ponts et Chaussées, and have the control of the gas in Paris. Mons. *M. F. E. Belgrand*.
4656. Does the evidence you are about to give divide itself into several heads?—Yes, it does.
4657. Will you first give us the length of the gas pipes which have been laid in subways in Paris?—It is nearly 2,150 metres.
4658. That is the total, is it?—Yes.
4659. Will you divide that into the various lengths?—About the year 1821 they placed a conduit of 750 metres in the gallery of Des Martyrs; it was taken up in 1832, at the demand of the inhabitants.
4660. It was taken up in the year 1832, at the request of the whole neighbourhood?—Yes; in consequence of the demands of the inhabitants, who complained of the effects thereof, and the consequence of certain explosions; another conduit has been deposited in the Gallery of Napoleon III., at the Louvre; that was in March 1856.
4661. They put another pipe in the Place Napoleon III.; was that 800 metres long?—About 800 metres; but I cannot speak to that positively, as it is not in my

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my department; but it was about that; it is still there, notwithstanding one explosion, which has not had serious consequences.

4662. Besides that, are there not short lines of pipes in various other streets, amounting to 600 metres?—In the subways of the bridges of Paris there are—about 600 metres in length.

4663. Now that the pipe has been taken up in the subway of the Rue des Martyrs, there remains only 1,400 metres altogether in Paris of gas pipes in subways?—Yes; since they took up the galleries in the Rue des Martyrs.

4664. Will you give an account of the explosions and accidents which have taken place from gas pipes in the subways in Paris?—I have already made mention of one which occurred in 1832, and which caused the taking up of the subway in the Gallerie des Martyrs. In 1861 there were explosions in the gallery of Napoleon III. in the Louvre. The Ministers of the Government Board denied those accidents, and contested those accidents, because those subways were placed in opposition, or in spite of the municipality of Paris and the gas company; but I have every reason to think that the fact is true, for these reasons: my own workmen pointed out the fact to me, and at the same time the working men of the gas company notified the fact also to the company. This is an extract from a report of the company's engineers: "Several of the explosions which happened in these subways justified fully the apprehensions which the company has expressed from the very beginning, with reference to that mode of laying down the pipes." I wished to know the exact truth on that matter, so I addressed questions to the plumber who keeps up the pipes. He answered that several joints were opened, and there were escapes therefrom; that they had been repaired, and there had been a little explosion, but without any serious results. The most serious explosion took place on the 5th of March last, in the subway of the Bridge of Austerlitz. That was a very important escape, that took place in a pipe measuring about half a metre that was placed in that subway. They wished to repair a leak on the 5th of March, and they sent down a workman, but he was suffocated—at least, they got him to his senses, he was not thoroughly suffocated. They could not repair the leak except by stopping the pipes at each side, outside the subway, at the two extremities.

4665. What is the length of the subway in which that pipe was placed on the Bridge of Austerlitz?—About 150 metres; and there are several ventilating shafts.

4666. Will you give us the other dimensions of the subway?—About 2½ metres in width; it is a low subway; the bridge is very low.

4667. *Chairman.*] Can a man walk or crawl along it?—He can walk in some parts; he can walk everywhere through it by stooping down.

4668. Mr. *Powell.*] What is the greatest height?—I never went in; but I believe that between some parts of the bridge it is tolerably high.

4669. Mr. *Vernon Harcourt.*] Can you say anything as to the accidents and explosions, owing to the leaking of gas into the sewers?—The sewers of Paris are much nearer the surface of the ground than the London sewers; and, consequently, much closer to the gas pipes; and it very often happens that a leakage of gas escapes into the sewers. I can quote several examples. In 1837 or 1838, a formidable explosion took place in a sewer of the Rue du Faubourg St. Honoré.

The *Chairman* inquired what this description of evidence was intended to prove.

Mr. *Vernon Harcourt* stated that the object of the evidence was to show the effect of a leakage of gas into a domed building, whether sewer or subway.

Witness.] Upon the occasion of the explosion in the Rue du Faubourg St. Honoré, the street-sweepers were knocked down, and the ventilators of the sewer were blown up as far as the first floor windows of the houses, and the windows were broken. In 1844, a similar explosion took place in the Rue Geoffroy St. Hilaire.

4670. Mr. *Powell.*] Was the pavement disturbed in the Rue du Faubourg, St. Honoré?—No; the heads of the ventilators alone. Another accident took place on the 28th of June 1853, in the Rue Hauteville.

4671. That

4671. That is, where two men were hurt?—Yes, a foreman and one of his workmen were burnt. There is another street called the Rue du 29 Juillet, where, on the 29th May 1857, a strong explosion took place, and the workmen were slightly injured in the face and hands, and nothing more. In the year 1850, a strong explosion took place in the Rue de la Concorde, in a sewer named the Rivoli. On the 26th December 1860, an explosion took place in a sewer in the Rue Dunkerque, where two men were burnt in the face and hands.

4672. Mr. *Vernon Harcourt.*] Was that an explosion from gas?—Yes.

4673. Will you give the next?—On the 26th June 1860, an explosion took place in the Roubaix-square, where four men were severely injured; they were ill during two months; the Company admitted that that was a gas explosion, and gave an indemnity to the working men.

4674. Have you read the evidence which Mr. Hemans and Mr. Bramwell have given upon this subject, as to your having been mistaken about these explosions?—I have read that summarily; I do not think I can be mistaken, because it was I, myself, who judged the indemnity for the working men; I am certain I cannot be mistaken upon that point.

Mr. *Vernon Harcourt.*] The mistake between the parties is, that M. Belgrand speaks of explosions that took place from leakage in the sewers; and Mr. Hemans understood him to have given the explosions that took place in the subways.

Mr. *Phinn.*] It is explained in the evidence that both Mr. Hemans and M. Belgrand agree that it was from a leakage into the sewer.

Chairman.] There does not seem to be any contradiction on that point.

4675. Mr. *Vernon Harcourt.* (*To the Witness*).] Will you go on with the list of explosions?—In March 1861, in the Rue de Bordeaux, at la Villette, there was an explosion in the sewer, and one workman was severely injured in the face and the right hand. On the 31st May 1861, in the Rue Richelieu sewer, an explosion took place, where two working men were slightly injured in the face and the hands. On the 4th September 1862, in a sewer in the Rue Caumartin, a gas explosion took place, arising from leakage of a pipe in the street, and workmen were injured. It is not always known where the gas comes from which causes the accidents. On the 6th September 1862, in the Circular Sewer, a violent gas explosion took place, where two cartmen were injured, and two working men, who had got into the sewer, were burnt, and they were got out with great difficulty by the men employed in the sewer. The next explosion occurred at No. 5, Rue de Marseille, January 13, 1863; a plumber, in the service of the water company, was burnt in the face and hands while in a branch sewer of a house, by an explosion of gas coming from an adjacent pipe. On March 11, 1863, in the Rue St. Augustin, two explosions took place in a ventilating chimney of a sewer, where one workman was severely injured in the face and hands. In the course of the summer of 1863, in a sewer on the Boulevard Beaujour, a gas explosion also took place from an adjacent pipe, and three workmen were injured. In a sewer at the Portes des Ternes, on January 17, 1864, an explosion took place from an adjacent pipe, set on fire by a workman, who had his beard and his hair burnt. On March 3, 1864, in the Rue des Fossés, St. Bernard, an explosion took place in a ventilator of a water-pipe, probably by having a cigar thrown into it; the top part was knocked up, and fell upon a man passing by, and injured him on the forehead.

4676. That was the stopper of the ventilator that was blown out into the street?—Yes; the details I have given you are arrived at from the reports of persons employed in my office.

4677. Has the evidence of these accidents satisfied you that it is extremely dangerous to bring gas pipes into or in contact with a close passage like a sewer or a subway?—Undoubtedly, there is danger; but how can any one act otherwise than by having them near a sewer or a subway?

4678. What would you think of a proposal of putting gas pipes into a subway?—I am quite convinced that it is dangerous, and moreover, my predecessors and 13 engineers who were in my employment, entertain the same opinion. I consider it dangerous to do it in a city, where the life of man is taken any account of. An English engineer came to consult me upon that subject, and one of the engineers in my employment came in at that moment; I asked him, "What do you

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you think of placing gas pipes in sewers?" He said, "The day upon which these pipes are placed in sewers, I shall not go into them without having made my will previously."

4679. Do you think that the placing of gas pipes into a subway, would entirely prevent the leakage which at present takes place in gas pipes?—Certainly not; and these are my reasons for saying so. It is certain that the shaking occasioned by the carriages is one of the principal causes of the leakage; but there are streets in Paris where, so to speak, no carriages pass, and where the ground is never affected by gas pipes. I name principally, in this case, the Rue Racine. In like manner, the shaking produced by carriages affects the water pipes; we have conveyed a great length of water pipes in the sewers, and we have leakage in those water pipes which are conveyed into the sewers.

4680. Showing, therefore, that the shaking of the carriages is not the sole cause of leakage?—Yes, but it proves that it is a very active cause. The variations of temperature of water and gas is another reason. The principal cause is the variation of temperature; this is proved by the cases I have cited, which took place principally in the spring. They take place principally in the cold seasons, in the winter, spring, and also autumn, because then there are contracting movements in the pipes.

4681. Do the proposed subways in England, in all those respects, resemble the existing sewers of Paris; have you seen the plans of the subways proposed in England?—Yes, one of the plans; I received plans from two engineers.

4682. And would the objections you have stated apply to the passing of gas pipes through such subways as those proposed?—It would necessarily be a very dangerous thing, as I have just explained; there would be the difficulty with regard to managing the working part of the service.

4683. What are the difficulties which you state would arise, with reference to the working of those gas pipes?—When the smell of the gas discloses the leakage of gas, it would be very difficult to approach that place through the suffocating and inflammable atmosphere. I have cited you an example of the subway of the Bridge of Austerlitz, where a workman was nearly suffocated before they got to the leakage, and they had a great deal of difficulty in taking him out and restoring him. Very often you cannot enter into the subway.

4684. Does the difficulty you have stated, with reference to the subway of the Bridge of Austerlitz, apply to those cases of the sewers where the gas has leaked into them?—It applies to all subterranean passages, even when the sewers are very great. I have cited also an example in the sewer of the Ceinture, which is a large sewer, six feet wide and nine feet high. I think that even in the large sewers the effect would be dangerous if the leak was very considerable, as it was in the case of the Bridge of Austerlitz.

4685. Do you know how the leakage took place at the Bridge of Austerlitz?—That was a bad joint which opened; that accident might happen anywhere; all engineers know that joints are not perfect.

4686. Then your opinion is, that an escape of that kind is one which might happen from variations of the temperature?—In certain cases that would be possible; if a joint were badly made, the variation of temperature might make that joint give way; it is possible that the variation of temperature might cause the pipe to leak; that happens in water pipes also; I could not say how it would be possible to make joints in the pipes; as for instance, a pipe down a lateral street, with a main pipe in the street; the pipes are charged night and day. This is the process in Paris; they make two holes in the pipe at each side of the place which is to be repaired; they fasten it with india rubber on each side, then the repair is made afterwards; while these holes are being made, there is necessarily an enormous leakage of gas which the workmen are with difficulty able to bear even in the open air, and which, in the sewers, would certainly suffocate them. I am speaking of the practice in Paris; I do not know what the practice is in London; if I well understood those plans which were shown me, the galleries which contain the gas pipes should be placed in communication with the cellars of the houses, and I say that in case of leakage you will bring the gas into the cellars, and you will thereby cause frightful accidents. It is not an explicit plan, but I think that in that case the danger would become as great in the cellars of the houses as it is in the subway itself.

4687. Would you permit, in Paris, that gas pipes should be introduced into the

the sewers, even those of the largest dimensions?—No; we have always resisted it.

4688. Is that the opinion of all the engineers in Paris?—All the engineers of the municipal service of Paris.

4689. And of other engineers in other parts of France?—I know nothing at all about their opinion. I say what I know.

4690. I am now going to ask about the water pipes. You do not find the same objection precisely to the introduction of water pipes, do you?—No. The objections in that case are to the enormous expense of making the subways especially for the water pipes, if you do not use them for gas pipes. (*The Witness explained a Plan to the Committee.*) This is the smallest of our sewers, which cost 120 francs a metre. We can enlarge our sewers, at an increased cost of 14 francs per metre, so as to place in them one water pipe of the diameter of 20 inches.

4691. Did you originally have the intention in Paris of making subways separately from the sewers?—The original plan was to make a special subway for the water pipes in Paris, and they actually constructed one in the Rue des Martyrs and the Rue Saint Lawrence; we could not come to the idea of continuing these subways, because the expense was much too great.

4692. What length were those subways?—We have given them already.

4693. Was it for gas or water that these galleries were constructed?—The subways of which I have spoken were made in the year 1815. Since that time they have been given up, because they cost a great deal too much. It was in that subway of Rue des Martyrs that the explosion took place of which I have spoken. Since that period, they have ceased constructing special subways in Paris, because they cost a great deal too much, being about 6*l.* per yard.

4694. And since that time have not the sewers been used to carry the gas pipes of Paris?—Since that period, in Paris we have used the sewers for carrying the water pipes, because that was a much cheaper method of construction than making a special subway for the purpose. I have converted the original subway in the Rue des Martyrs into a sewer. It is a remarkable fact, since the subway in the Rue des Martyrs has been made into a sewer, it has become much more wholesome, because people regularly enter it and clean it. In a sewer they are obliged to constantly enter it, for the purpose of cleansing it; whereas, in a subway, the workmen were constantly suffocated from its being kept closed. One of the great objections to subways is, that persons only enter them when there is some work or repairs to be done; whereas, in a sewer, they are constantly going there; in the side streets they will never go.

4695. What did you find the condition of the subway in the Rue des Martyrs when it was entered?—When we entered the subway in the Rue des Martyrs we found it in an extremely unwholesome condition; the walls were covered with slime; this was due, no doubt, to negligence on the part of the workmen, but that is a negligence which often happens. When there is no regular work to be done in a subway, it is very difficult to get the men to go down there regularly, and, besides, that, you want somebody always to look after it, to overlook the overlookers.

4696. Do you find that that happens in the special subway of the bridges of Paris?—People very seldom go under the subway, because there is very little to do; people do not go there unless there is a very evident leakage, as in the case of the Bridge of Austerlitz.

4697. Do you think that if the pipes in the Place Napoleon III. had been laid in the subway there would have been more accidents than being laid as they are in the sewers?—The pipes in the case of the Place Napoleon III. were in the best possible condition, and were much safer, because the men who were cleansing the sewers gave immediate information of the leakage; whereas, in the case of the subway, that would not be immediately observed.

4698. However, you would not advise that the gas pipes should be laid, even in the sewers?—No, I am certainly of that opinion; I have just expressed it in the most explicit manner.

4699. Will you tell us the expense which would be caused by laying water pipes in special subways, made for the express purpose of carrying the water pipes alone; I am speaking of the subways of Paris?—For a pipe of 10 centimetres it would cost from 10 to 12 francs.

4700. Do you say that the cost of making a subway to lay these pipes would

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be 10 times as great as to laying them in the sewers?—Yes; it would cost 10 times as much to make subways to carry pipes for the water, as it would do to place those pipes either in the earth, or in the sewers.

4701. Then, I understand that your opinion is that, in no case, the gas pipes should be put into a subway; and that the method of conducting water pipes in subways, is too expensive a method to be adopted?—Yes; it is my opinion; it is impossible to introduce gas pipes either into sewers or subways, without the greatest danger to life. It would be a ruinous expense, either for the municipalities to make subways for the water pipes, or for the companies to make those subways for the water pipes; but it is an excellent thing to put them into the sewers, not constructing them for the purpose. I am of opinion that it is much too heavy a tax to impose either upon the municipality, or upon the water company, to construct subways for the purpose of carrying the pipes.

Cross-examined by Mr. *Wilkinson.*

4702. Are you the chief of the engineers of the Ponts et Chaussées, and are there not two bodies of engineers in Paris, one acting for the municipality, and the other for the Imperial Government?—I am for the municipality of Paris. I am detached from the engineers of the Ponts et Chaussées, for the special service of the municipality of Paris; and I am not paid by the Imperial Government.

4703. Is there a difference of opinion between the engineers of the Imperial Government and the engineers employed for the municipality?—The engineers of Ponts et Chaussées have not debated this question. It has never been seriously discussed by the engineers of either party. This question has never been discussed among the engineers, who do not form a part of the municipal staff; but it has often been discussed by the municipal engineers. All the engineers have not been applied to on the subject

4704. Therefore, you cannot give the Committee any idea of the opinion of the Imperial engineers upon this question?—I cannot; it is impossible.

4705. I am going to ask you a few questions about the accidents of which you have given an account. You have given a long list; I only wish for an explanation of one or two. You have spoken of an accident in the Place Napoleon III.?—Yes, in the year 1861.

4706. That gallery was placed there in spite of the representations of the municipality of Paris and the gas companies?—It was placed there by the architects of Paris against the advice of the municipality of Paris, and of the gas company interested.

4707. You have also a report of the gas company?—Yes.

4708. Mr. *Harcourt.*] Is that the report you made against the project?—I made a report upon the accidents, and also an anterior report against the plan.

4709. Mr. *Wilkinson.*] Will you produce the report you made upon the accidents in the Place Napoleon III.?—I made two reports; the first when they placed the gas pipes. I made a report that they should not continue the work; I made another report also on the accidents.

4710. I hold in my hand the report that was made upon the accidents?—Yes.

[*The same was delivered in, and is as follows*:]

"M. Le Bondry, engineer of the Paris Gas Company, thinks that they must have given rise to a considerable number of escapes of gas, but that they were repaired before they had produced any grave accident; one single explosion has taken place without causing any misfortune.

"The gas pipes in the Place du Louvre are otherwise in excellent condition. They have made no other branches upon the pipes than those which were anterior to their being put in service. One does not well see how they could practically, that is to say, with perfect safety, make from time to time branches in the gas pipes laid in the sewers."

4711. In your report did not you state that the engineer himself says, that though these leakages have been numerous, they have been easily repaired and without

without grave danger?—The opinion which he has given, at the close of his report, is, that it is not convenient to introduce pipes into subways.

4712. Is that the conclusion, to which you have arrived in this report, founded upon your individual opinion, and not upon the result of this accident?—The result of the accident has something to do with my opinion; but it is very difficult to reply to that question.

4713. Was there in that gallery any gas pipe?—Yes, there was. If you like, I can show you the plan.

4714. *Chairman.*] Did you personally verify that account?—No; it is not possible for me to examine every document, but they were sent in by persons in my employment, by the head officer under my orders.

4715. Will you undertake positively to assert, that there ever was an explosion of gas in that gallery?—I received a report from my chief of service, and the gas companies likewise received a report of the accident. I cannot answer for the reports of the agents of the municipality. I have no reason to think they are not exact.

4716. Have you here a report which your chief engineer made to you?—I have not the report; it was a verbal one.

4717. Have you a report of the accident of which you have spoken?—I have not. I have some notes, but not reports; these are extracts from official documents in the office.

4718. Have you any reports of an accident, occasioned in a sewer by the explosion of gas, where the gas pipe has been laid in the sewer?—The majority of the accidents have been produced by gas pipes placed outside the sewer, and the gas penetrating into the sewer, by filtration, through the masonry.

4719. Has there been an instance of an accident occasioned by any other cause than the filtration into the sewer in the manner which you have just mentioned?—When accidents have happened, it is always known whether it is the gas, because the gas has a special odour, which is immediately recognized. The workmen who have been burnt, have said, "We have smelt the gas."

4720. Has there been an actual explosion of a gas pipe in a sewer?—There was an explosion in the gallery of the Rue des Martyrs.

4721. Was not that explosion occasioned by a leak in the subway?—No; the pipe was placed in the subway.

4722. Was that an explosion or a leakage?—An explosion; all the workmen whom I employed told me it was in reality an explosion.

4723. Can you certify to the cause of the accident?—I can only verify it by the testimony which was brought before me.

4724. Was any damage done by it?—It happened in the year 1831 or 1832, and it is too old to refer to; I cannot say.

4725. Have you visited the present subway in London?—I was for the first time in London this morning, and I have not seen anything whatever.

4726. When were you summoned to London?—By a telegram on Friday, at seven o'clock.

4727. Had you before that seen a plan of the proposed subway?—Yes, because Mr. Hemans gave it to me.

4728. When?—About three weeks or a month ago, on the occasion of his visit to Paris.

4729. Have you remarked the difference between the Paris subway and the proposed subway in London?—I have seen a difference.

4730. Have you seen the means of ventilation in the lateral passages?—Yes, we have the same thing in our Paris subways.

4731. Did Mr. Hemans explain the means of ventilation to you?—I think there were ventilators at a hundred metres; I recollect now that he said one hundred metres.

4732. Did Mr. Hemans explain, also, the lateral galleries?—I think our lateral passages are in communication with the galleries under the street pavement.

4733. Do you know that there are means of communicating with the surface by means of gratings?—Yes, we have all that in our Paris sewers.

4734. Have you also remarked the distance of the gratings in the lateral galleries?—When I speak of 100 metres, I refer to those in the central area.

4735. Do you think that if the central apertures which you understood to be at 100 metres distant were at 30 metres, the means of ventilation would be

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sufficient?—In our sewers in Paris the central apertures are at a distance of 50 metres.

4736. Have you remarked the division which exists between the subway and the sewer?—Yes.

4737. Do you think that this division is an improvemement upon our system, in Paris?—I think not. I think our system in Paris is better for two reasons: in the first place, it is more economical, and in the second, it is so much larger, whereby the workmen can work easier.

4738. What is the size?—Our largest sewers, which conduct to the Seine, but there is no water in them, are 5 metres 60 centimetres in width, and 4 metres 40 centimetres in height. There is but one subway in Paris, which is not a subway and a sewer at the same time. In the majority of the sewers there are water pipes, and they are about to place more. With regard to water pipes, the question in my eyes is the expense. The town of Paris has declined them on account of the enormous expense.

4739. Supposing them to be made, will there be economy in their use by the companies?—There is no water company's pipe; the water is supplied by the Ville de Paris. The increased expenditure is not very great, being from 13 to 14 francs per metre; that is an insignificant matter. The enormous expense of which I have spoken, relates to the construction of a better subway, which is not at the same time a subway and a sewer.

4740. One question with regard to the danger from vibration. You have spoken of the danger both of leakage and explosion resulting from vibration occasioned by carriages passing on the surface. Do you think that the danger from that cause would be likely to be greater, if the pipes were laid on the surface of subways, than if laid as they are now?—There would be less leakage; but there would be some. It is much more dangerous.

4741. Why will it be more dangerous if the ventilation is secured?—In our sewers of Paris we have very powerful means of ventilation. We have apertures very near each other, being 50 metres apart. They have natural branches, which are furnished with a ventilator rising as high as the roof. I have shown Mr. Hemans, that by placing a wax candle at the entrance of the ventilator, the flame remained perfectly upright, and there was no ventilation. I have made that experiment hundreds of times.

4742. If in our present system we had made arrangements for sufficient ventilation, do you think the objection of danger would apply to this?—If the ventilation were as perfect as I hope it may be, there will be a variation of the temperature in the subway. If the ventilation be perfect, the heat above will be the same as the heat below. If it is a perfect ventilation the result would be the same, and if the temperature be different, the ventilation would not be perfect. In the old sewers of Paris there was no danger of suffocation, because there was sufficient water. In the new sewers they have made additions almost to the extent of the old city. The sewers are badly cleansed, and accidents sometimes happen; and it has been finally decided upon never to make a subway for the reception of gas pipes in Paris. If we can find the means of placing the gas pipes in subways, without danger, we shall do so. In that case it would be a great improvement, provided there is no danger. In my Report to the Minister, I have reserved the question. In the present state of affairs, it is considered a matter of impossibility; but I do not despair.

4743. Without actual experience, you cannot arrive at any result?—We must first show the mode of proceeding. We indicate the mode of proceeding. I find it but one, because it does not essentially differ from the experiments we have already made.

Examined by the *Committee*.

4744. *Chairman.*] Were the subways at the Pont Austerlitz taken up after the accident?—We are unfortunately compelled to retain the pipes, because we have no other place to allow them to pass.

4745. What is the size of the gas pipes?—Fifty centimetres diameter.

4746. Cannot they put them outside the bridge?—The bridge has a beautiful appearance, which we have no wish to destroy.

4747. Mr. *Powell.*] Is there any passage to let the water escape from the subway in the event of a water pipe bursting?—It will run into the sewer corresponding

sponding to the gallery. No serious accidents have happened, but only a little leakage, as if passing through a sieve.

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4748. Mr. *Floyer.*] Was there any loss of life in either of those accidents?—No, they were all cured, but more or less disfigured. In nearly every case they were injured in the face.

4749. Mr. *Powell.*] Are the galleries over the bridges in Paris under the control of the municipal engineers or the Imperial engineers?—They are under the control of the engineers; but I have the authority of placing the apparatus; I have the power of placing the gas and water pipes.

4750. And of keeping them in repair?—Yes.

4751. Do you know during how long a time the gas pipes were in the subway in the Quai Martier?—They were placed by the Government for the service of the Opera. Louis XVIII. caused those pipes to be placed for the supply of the Opera and the Théâtre Français. They were placed more especially for the supply of those two theatres; but there were pipes for the houses also.

4752. What was the size of that subway?—Three metres in breadth, and a variable height.

4753. What was the average size?—In some parts it was at least three or four metres in height; in other parts they were obliged to bend.

4754. Was the ventilation good?—It was excellent in the upper part, and bad in the lower.

4755. How long is it from the surface of the roadway to the top of the gas-pipe in the Paris streets?—Generally, one metre; sometimes more; in some cases less than a metre.

4756. Have they the electric telegraph pipes laid in the sewers of Paris?—All the telegraphic despatches by England and the north, go through by means of wires placed in a large collecting sewer.

4757. Do you know the dimensions, generally, of the proposed subway in London?—I think four metres.

4758. Mr. *Du Pré.*] Do they complain much of the inconvenience arising from taking up the streets and replacing the pavement for the purpose of repairing and investigating the pipes?—When we repair our sewers we never take them up, but make new ones.

4759. Mr. *Powell.*] Can you tell me the size of the largest water-pipe that is laid in a Paris drain?—The largest is one metre in diameter.

4760. Mr. *Floyer.*] Do they never find the water injured by the sewer?—Never.

4761. Mr. *Powell.*] What would be the length of a pipe three feet in diameter?—Four metres and 10 centimetres.

4762. Is there any difficulty in introducing such a pipe?—We make holes expressly for the purpose.

4763. Is there any difficulty in effecting repairs of such pipes and subways?—On the contrary, we have a way of our own of repairing.

4764. Mr. *Phinn.*] Perhaps the Committee will allow me to ask whether there is any check provided in Paris for preventing the too frequent breaking up of the streets where two departments wish to break them up?—For gas, we go through the same operation as formerly.

4765. How many companies supply gas to Paris?—There is only one.

[The Witness withdrew.

Thomas Greaves Barlow, Esq., sworn; Examined by Mr. *Davison.*

4766. YOU are a Civil Engineer, practising mainly, I believe, as a consulting gas and water engineer?—I am.

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4767. You have had an experience of 30 years in that branch of the engineering profession?—Upwards of 30 years.

4768. Have you made yourself acquainted with the provisions of the Bill as it now stands before the Committee?—I have not seen a copy of the Bill as it has been amended; I have seen the original Bill.

4769. Have you considered the various proposals, under the Bill, with reference to the gas companies?—I have.

4770. In your opinion, would the laying of gas pipes in subways, as proposed

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by the Bill, be attended with considerable danger and inconvenience?—My opinion is, that the laying of gas pipes in subways, such as I see figured on the plan before me, would be highly dangerous.

4771. I believe your first reason for giving that answer is, the effect which the fluctuation of the temperature would have upon gas pipes when laid there?—That is so; I do not think the effect of the fluctuation of the temperature has been sufficiently studied by the parties who have given evidence in favour of the scheme.

4772. At present the gas pipes are laid on the average something like two feet below the surface?—From two to three feet below the surface.

4773. At that point the temperature does not vary much from one part of the year to another?—Not greatly.

4774. If laid in these subways, they would consequently be exposed to a much greater change of atmosphere than they are at present?—They would be exposed to much greater variations.

4775. To what extent would the change of temperature cause an expansion or contraction of these pipes?—For every 10 degrees of change of temperature, there would be an alteration in a mile of pipes of four inches.

4776. May I ask you, whether, in your judgment, if these pipes were laid in subways as proposed, they would be liable to such a change of temperature as that in particular seasons?—A great deal more than that; I believe they would be liable to changes of at least 30 degrees of temperature.

4777. What would be the effect of a change of 10 degrees of temperature; would the pipes be liable to leakage?—The effect of a reduction of 10 degrees of temperature being to diminish the length of the pipes, of course there would be an opening at the joints.

4778. That is your first objection to the proposal as it now stands?—That is so.

4779. As regards the repair of these gas pipes, of course if they were liable to that change of temperature, the repair would be more frequent almost than it is in the present state of things?—It would be very difficult, I apprehend, to make repairs at all when the leakage takes place.

4780. But it would necessarily have to be done by means of artificial light?—Yes.

4781. If the pipes were placed in these subways to-morrow, there would be a difficulty in finding where the leakage occurred?—A great deal of difficulty.

4782. That would necessarily have to be effected by means of an open flame?—That is the only means of doing it.

4783. Does that lead you to the second objection you have to these subways, that they would be liable to explosion if the gas was carried through them?—They would so.

4784. Where the gas escapes into the air, there is an explosive mixture formed, I believe, of from 7 of gas to about 100 of air?—The mixture is explosive from about 7 to 16 per cent. of gas to 100 of air.

4785. I believe a mixture of 12 of gas to 100 of air is equivalent to something like 90 lbs.?—I do not know that the experiments are sufficiently definite on that point, but I believe that the result of the experiments has been that it is an explosive force of about 90 lbs. to the inch; the most explosive is 12 to 12½ per cent. of gas.

4786. As regards the ventilation of the subway, you have given your answer as regards the fluctuation of the atmosphere, I suppose, upon the presumption that there would not be a rush of cold air sent in through the subway?—As long as the temperature in the subway is below that of the temperature of the external air, there can be no ventilation whatever; there is perfect stagnation; but, if you want to raise the temperature of the subway, either by artificial heat or driving it through by mechanical power, you may produce ventilation.

4787. That would produce ventilation, but it would also produce, would it not, an alteration of the atmosphere, which would act on the pipes that are laid there?—They would do so, to some extent.

4788. You are well acquainted with the cost of laying new gas mains in trenches in the ordinary way?—I am.

4789. You have had a very large experience, have you not?—Yes.

4790. Will there be any saving of cost in laying new pipes in a subway in new streets?—Instead of their being a saving, I apprehend there would be a very

very large increase in the cost, from 20 to 25 per cent.; that is, in the cost of laying; it has nothing to do with the cost of the pipes.

4791. Simply the cost of laying them in a subway, as compared with the cost of laying the pipes, as they are laid every day in trenches in the streets throughout London?—Yes.

4792. Would it make any difference as regards the diameter of the pipes?—My answer, generally, is this: that to lay a pipe, be it a large one or a small one, in these subways would, I think, cost from 20 to 25 per cent. more than laying them in the ordinary way in the surface.

4793. Whatever the size of the pipes?—Yes.

4794. *Chairman.*] Have you made any estimate?—I have not made any detailed estimate, because it is impossible to do so until actual experience has been obtained; but I have made inquiries from some of the most experienced contractors for work of that sort, and that is the opinion they give.

4795. Mr. *Davison.*] Now, as regards the cost of interfering with the existing mains, that would be something considerable, would it not?—Of course, if the existing mains were put in these subways, a very large expense must be incurred.

4796. That expense would not arise with regard to new streets?—Not if it is a new street in which no main is actually laid.

4797. I believe you are intimately acquainted, are you not, with the Paris Gas Works?—Yes.

4798. I believe you act for them?—They consult me very frequently.

4799. Have you heard the evidence which the last witness has given, as to what has been done in Paris with reference to the sewers there, and carrying the gas pipes through them?—Yes; I know the strongest feeling exists on the part of the officers of the Paris Gas Company, against laying gas pipes in either streets or subways.

4800. You agree with them, that it is not desirable to do so?—I know they refused, as long as they were able to do so.

4801. You have heard the last witness examined this morning, with regard to the reasons he has given for thinking that it is not a judicious thing to do; do you agree with him generally?—Quite so. I was very much pleased with his evidence.

Cross-examined by Mr. *Phinn.*

4802. Do I understand you to say, that you are yourself opposed to gas pipes under cover?—Do you mean covered up?

4803. I mean covered up?—I would lay them in the ground, and then cover them up.

4804. That is exactly what I do not mean; I mean in any place, however large constructed, in the shape of a subway?—I think that great danger would be incurred by leaving them exposed.

4805. Do I understand you to say, that supposing you carried them across a building, or over a bridge, that there is more danger than laying them in the ground?—I observed the other day, with regard to the pipes laid across the bridge at Charing Cross, that there was special provision made for the expansion and contraction of the pipes by telescopic joints.

4806. Did you find that the gas pipes were carried over Blackfriars Bridge?—At Blackfriars Bridge they are carried under the roadway; I am not quite sure whether they are under the roadway; I think I have seen one by the side of the bridge.

4807. *Chairman.*] The new bridge or the old one?—The old one.

4808. Mr. *Phinn.*] Do you find that they leak more than the other gas pipes?—I have not heard them complained of.

4809. We will take Waterloo Bridge; are the pipes there exposed?—I cannot tell; I have not observed them.

4810. Vauxhall Bridge?—With regard to Vauxhall Bridge, I should think that they are laid between the girders and the bridge; I am not sure.

4811. In all those cases, would they not be subject to the alteration of the temperature?—They would.

4812. As you say this alteration in the temperature produces a contraction or elongation of the pipes, can you point out any instance in which the pipes going

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going over those bridges at the joints, where they are exposed, have been more subject to leakage than any other part?—I have not examined them generally for that purpose; but I can give you an instance which occurred within my own knowledge, in the little town of Tunbridge Wells, for the gas company, in which town I am engaged. In the month of December 1863, a 3-inch pipe which was laid about 15 inches below the surface, and 2 feet from the wall of a cellar, contracted to that extent that it broke off the branch service pipes, and the gas escaped into the cellar. A servant went to get coals at night with a candle, and the consequence was that it caused an explosion, and she was very seriously injured. The Company paid heavy damages.

4813. How did you ascertain that that was caused by the contraction of the pipe?—It was examined at the time the ground was opened, and the pipe itself was found to be in a different line with the main pipe.

4814. Did you see that yourself?—No.

4815. Then, you are speaking of that from hearsay?—I was consulted by the company on the occasion. I inquired into the facts, and those were the facts upon which I advised them to pay the damages.

4816. Would a heavy weight, passing over a pipe on the surface, affect that injury?—No.

4817. You do not think a heavy weight, passing over the surface of a pipe laid 15 inches in the ground, would be likely to break it?—That would affect it in another direction; this was in a lateral direction. I ascertained that from the agents of the company.

4818. You spoke of the fluctuations of the temperature; in gasworks, do you not frequently see pipes exposed, running in every direction?—Yes.

4819. Do you find the pipes close to the gasometer affected by the fluctuations of the temperature?—You do not get them in any great lengths.

4820. Do you find the gas from the pipes so exposed is more subject to leakage, than the pipes elsewhere?—I cannot say that I have observed them particularly with that view. Close to the gas works, the pipes are not generally in any great lengths. There are a few lengths of pipe, and then a bend, or branch; and the expansion or contraction in so short a length is not considerable.

4821. Now, I will take another intance; take the instance of a gas pipe by the side of a railway; do you not continually see gas pipes laid in long lengths exposed by the sides of railways?—No.

4822. Have you not seen it?—No; I have seen telegraph pipes.

4823. We are not talking about telegraph pipes, but gas pipes?—You often see wrought-iron pipes so exposed, but, then, that is a different joint. Those pipes are screwed together.

4824. Do you mean to say that all those pipes which we see exposed at railway stations, are all wrought-iron?—In 99 cases out of 100.

4825. Are you sure of that?—Yes.

4826. Do you use wrought-iron wherever the pipes are exposed to air?—No; they are used specifically for that, in the first place; they are made in longer lengths, and they can do with a less number of joints. There are certain practical reasons why they should be used in preference to cast-iron pipes; they can be kept straight, in consequence of long lengths.

4827. Does your objection apply to these subways, that is, Covent Garden and Southwark, as actually constructed, or to any possible modification in those which may be hereafter constructed?—It applies to the proposal before the Committee, to lay gas and water pipes in subways such as are ordinarily constructed.

4828. That is, Covent Garden and Southwark?—Yes.

4829. Have you been down both of those?—No; I saw them both during their construction.

4830. Have you been in either of them since they have been constructed?—No.

4831. Then you have not seen the gas pipes which have been laid in Covent Garden for the last two years?—I believe they are laid in the ground, and are invisible.

4832. They are laid under the subway?—In the floor of the subway.

4833. You have not extended your researches so far as Nottingham?—I have not.

4834. When were you first asked to come here and give evidence?—It might be two or three months ago.

4835. Then you are aware that you had an opportunity of seeing the Covent Garden subway and the Southwark subway, if you pleased?—I might have done so, I dare say.

4836. You think that the fluctuation of the temperature would be a serious thing in these subways. Have you at all taken any means to ascertain what the extreme fluctuations are?—The extreme fluctuations must be at least 30 degrees.

4837. I am not asking you what they must be; I am asking you whether you have taken any pains to ascertain what they are?—No, I have not.

4838. Neither with regard to Covent Garden nor Nottingham?—No.

4839. You have spoken also of the alteration of the temperature with regard to water pipes. Are not the water pipes laid at about the same depth beneath the ground as your water pipes are?—Water pipes are not all liable to it.

4840. Is it the fact, that they are laid at the same depth?—Yes, about the same depth; not less than three feet.

4841. Are they liable to contraction and expansion?—Only very slightly.

4842. Now, you have stated that the contraction, with an alteration of 10 degrees, would be four inches in a mile of gas pipe; what would it be with regard to a water pipe?—It would be the same if there is that difference in the temperature of the metal.

4843. Putting the Tunbridge Wells case aside, can you give me any instance where you have made a report in London that the leakage of gas has been occasioned from the contraction of pipes by the variation of the temperature?—No; I am not aware that I have made any special report; I have on several occasions drawn attention to the fact that a large portion of what is set down as leakage arises from the effect of the expansion and contraction of the joints of the pipes.

4844. You have not at all ascertained the fluctuation of the temperature, or the provision with regard to ventilation in the subway?—I have heard the evidence which has been given here, and I have examined the apertures for the ventilation in the Covent Garden subway, and I am quite sure they are perfectly insufficient, without some mechanical or artificial means.

4845. I presume you had made up your mind that these subways are bad things three months ago?—No; I should be very glad to see some practical mode of remedying the inconvenience of opening the pavement so often.

4846. Do you think subways are good things for water?—I do not think there is so much objection to water as there is to gas.

4847. I am not asking you as to the amount of objection; do you think it would be a good thing for water?—I think, for the distributing mains, they may be a good thing; but with regard to trunk mains I would, under all circumstances, prefer laying them in the surface; by trunk mains I mean the mains passing through to supply other districts.

4848. Why should you draw a distinction between the trunk mains and the distributing mains?—Because, if any accident happened to a trunk main in any one of these subways, you could not supply the district beyond the principal point where the injury took place.

4849. What sort of injury do you anticipate to trunk mains laid in a subway of this kind?—There may be injury from the possibility of an explosion of gas from the gas pipes laid under the roadway; you may get damage from this.

4850. Then you think there is a good deal of danger likely to arise from the exudation of gas through gas pipes?—There is danger.

4851. That would apply to having any pipes under the earth; therefore, we must not have any cellars, if you are going to that?—It does so.

4852. There is danger, according to your opinion, to every cellar in London?—Yes, and you increase that danger by laying the pipes in such a position that you must increase the leakage.

Re-examined by Mr. *Davison*.

4853. What I understand you to say is, that as regards the gas, you apprehend danger from the contraction caused by changes in the atmosphere?—Yes.

4854. My friend has asked you about the pipes which cross the bridges; ther

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there are special means employed with regard to the joints of those pipes?—Yes, there are means of compensating for the contraction and expansion of the pipes on the Charing-cross bridge, by means of telescopic joints.

4855. If mains are placed in the subway, and you had telescopic joints, the service pipes would be subject to contraction also?—Yes.

4856. That is the sort of accident which you say took place to your knowledge at Tunbridge Wells, arising from the contraction of the pipes, caused by the fluctuations in the atmosphere?—That is so.

4857. You think the ventilation of the Covent Garden subway is quite insufficient for the purpose?—The apertures are so small, that I think there can be no ventilation through them.

4858. Are you satisfied that that is so?—Quite so, except some artificial means are employed for creating a current through.

[The Witness withdrew.

Mr. *John Samuel Stephens*, sworn; Examined by Mr. *Holland*.

Mr. *J. S. Stephens*.

4859. ARE you out-door Superintendent of the City of London Gasworks?—I am.

4860. Have you been many years in that capacity?—Twenty-six years.

4861. How many gas companies are there in the City of London?—Three.

4862. There are two gas companies between whom the districts are divided?—There are.

4863. The City of London and the Chartered?—Yes.

4864. There is also the Great Central Company, which passes over both of the districts?—Both the districts.

4865. The new street which is projected from Earl-street, Blackfriars, to the Mansion House, is in the district of the City of London Gas Company?—It is.

4866. And the Great Central Company have power over it in competition?—They have, as well as ourselves.

4867. From what companies is that district now supplied with gas as far as you are concerned; is it from the main in Upper Thames-street?—Partly. The portion of our district southward of Great Bridge-street has been uniformly supplied from low ground mains; that is to say, for this intended street to be formed.

4868. Do not the mains in Thames-street supply on the south side of that street all the side streets as far as St. Paul's Churchyard?—They do on the north side.

4869. And Cannon-street on the north?—No; there is a separate main for that.

4870. Will the proposed line of street intersect all these streets?—Most decidedly.

4871. And, therefore, it would cut off the communications between those streets and the mains in Thames-street?—Between the mains in Thames-street and Earl-street; that portion of our district that lies between the south side of Ludgate-hill and the north side of the intended street.

4872. How would you propose to supply this district when this street is made?—The north?

4873. Yes. I presume the south side would be supplied as it is now?—Yes. The new portion, that is, north of the intended new street, must be supplied from a main driven out of the new street on the north side.

4874. What sized main would you require for that purpose?—The sized main specially for that road is not exactly the thing; we should require not only for the surface of this street 1,100 yards, which I believe it is to be, but the whole of that portion which would be lying north of the streets bounded by Ludgate Hill and St. Paul's Church-yard.

4875. For the supply of that portion, you would require a main equal to that which would be required in the street itself?—Unquestionably; and allow me to add, that as the new street is to be formed, it is right for the companies to look a-head and see whether there may not be something apart from the present supply, and whether they ought not to have regard for future consumption; that

that being the case, it is proposed to lay a main of 18 inches down from Earl-street up to the end of the new street; that is to say, about Blackfriars, on the north side.

4876. Would you not require a small main in addition to that for the supply of the street itself?—Yes; we propose to have a 6-inch pipe on the south side.

4877. I presume that the Great Central Company would require the same?—It occurs to me that their requirements would be much about the same as ours; they ascend and we descend; I have an idea that their arrangements are the same.

4878. Does not the City Gas Company sell two descriptions of gas; do they not supply Cannel gas as well as the more common gas?—We should for some of those large buildings; I think it quite right to make arrangements for the supply of Cannel gas along this side of the street.

4879. What mains would you require for that?—Small mains; I should propose to lay down a 6-inch main on each side of the street.

4880. And I presume the same observation would apply to the other gas companies?—The Great Central Company do not supply that; this is a section of Earl-street (*producing a Plan*). This represents the centre of the roadway; this represents the subway; it would have to cross those pipes (*referring to the Plan*). This shows a distance of 27 feet between the two outside mains. (*The Witness explained the Plan to the Committee*).

4881. Are you aware of what the water company would require to lay in that?—I have been told they require three mains, a large main and two small ones, and, I believe, there is no doubt of that.

4882. Did you hear Mr. Muir's evidence upon that point?—Part of it.

4883. Did you hear him state that it would require one large main and two 4-inch mains?—Yes.

4884. Have you made a calculation of the amount of space which would be required for laying these mains in a subway?—The space that I make is from 24 to 26 feet wide.

4885. Mr. *Phinn.*] For the whole of the pipes?—Yes. (To Mr. *Holland.*) —Are you speaking of the whole of the pipes, or my pipes only?

4886. Mr. *Holland.*] The whole of the pipes?—It occurs to me as being from 24 to 26 feet.

4887. What is the width of this new street?—The principal portion, I believe, is intended to be 70 feet wide; but what is called New Earl-street, is only 50 feet wide, and will remain so.

4888. If the pipes were laid as you propose, occupying 70 feet in the centre of the street, that would leave 22 feet on each side from the houses, would it not?—Yes, that is what I think I make it, 22 feet.

4889. What depth would your pipes be; have you calculated what the depth will be?—What depth is the subway to be?

4890. What do you suppose the depth of the subway to be; do you assume that?—I should think nine or ten feet.

4891. That would be supposing the subway to be three or four feet below the surface?—Yes.

4892. You think for a subway of those dimensions, it would require 10 feet in height?—Ten feet in height, internal dimensions.

4893. Would that make your height about 14 feet below the surface?—Yes, it would.

4894. If the mains were laid in the soil in the ordinary way, what depth would they be?—I think the average may safely be taken at about 12 feet.

4895. What would be the length of your service from the pipe to the houses under the ordinary system?—It would be, if I understand your question, 12 feet.

4896. If the pipe were laid in the subway, have you calculated what the length of your service pipe would be?—It must be certainly more than 22 feet, because we have also to consider the position of the pipe in the subway; they may be near the centre or far from it. Then again, we have to consider the depth of the pipes, or whether they would have to be run obliquely or perpendicularly, so as to get to the proper spot, with reference to each of the houses, which would raise it very considerably.

4897. You think that would raise the expense of the service pipe very much beyond what it is at present?—It might do that.

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4898. In making this calculation, have you not taken into consideration the means of supplying any district beyond this point?—No.

4899. You have only taken into consideration what would be required at the present time for that district?—No. The 18-inch main I propose is not only to supply the whole of the district immediately in connection with the new street, but the strength of the supply by the main which passes through Walbrook and goes round the Mansion House, which is a 10-inch main, is very weak at that point; and, in order to keep up anything like a good pressure, we are compelled to work very uneconomically; that is to say, we are obliged to raise the pressure at the works in order to get a sufficient supply.

4900. Do you think, having regard to the probable requirements of your district, that it would be prudent for you to have the means of laying a still larger main in that street, if necessary?—I think not.

4901. You think that two will always be sufficient?—I think that we shall be amply provided.

4902. How many branch pipes would there be in that length of subway leading up to the streets?—I think about 19 or 20, northwards.

4903. Then you would require to have openings for those mains as well as the other pipes?—For those mains which are connected with the lateral streets.

4904. I understood you to say that the mains which you have mentioned as being necessary for the supply of that district will be cut off by the new street?—If a main of some considerable size be not laid on the north side of the new street, I do not intend crossing the street (that is to be avoided, if possible); a main of some considerable size must be laid upon the surface of the street, and to keep up the supply, a smaller main also to supply the district which will be cut off from the low ground by reason of the new street.

4905. Will you state to the Committee what pipes there are at present in Earl-street, Blackfriars?—Do you mean at the commencement of the new street?

4906. Yes?—I will begin at the north side. The City Gas Company, 12-inch; the Great Central Gas Company, 3-inch; the City Gas Company, 9-inch.

4907. Have you explained that map to the Committee?—I have shown them to the Committee already on the map.

4908. In general, then, we may take it that there are 11 mains?—Yes; out of them one supplies the Post Office; that is an independent supply.

4909. All these mains will be affected by the subway?—The subway will run transversely to the whole.

4910. Then all these mains will have to be carried either across the subway or partially along it?—They must be, on account of the depth.

4911. In the plan which you have made, if one large main is on the north side, and a smaller main on the south side, running along the street, would it be necessary for you to connect those two mains together?—I propose to adopt this course: First of all, in the commencement of the new street, the large main would just cover the street, and then there would be an 18-inch for the branches; then there would be naturally a connection in Cannon-street by these two mains; therefore, at this corner, near Blackfriars, in addition to that, it might be desirable to have a cross-communication somewhere about Peter's Hill. That is the only one I propose to keep up the supply, on account of the length of the main.

4912. So that these cross-communications would form, so far, an obstruction in the subway?—That is unavoidable.

4913. I think you have had several accidents from the leakage of gas in your district?—Many accidents have happened in the sewers arising from explosions.

4914. Have you kept an account of them?—Yes; I can hand in a copy of the reports.

[*The Witness handed in the same, which is as follows:*]

"CLOTHFAIR.

6 March 1844.—"Three inches broken in the brickwork of gulley of sewer.

× 1. *Explosion in Sewer in Leadenhall-street.*

21 May 1845.—"An explosive ignition, which scorched a labourer of Boucher, the sewer contractor, very much, though not dangerously.

× 2. *Explosion in Sewer.*

28 September 1849.—"Explosion in Sewer.—4-inch main broken on west side of Gracechurch-street, by Nag's Head-court; led to an ignition and explosion, by which one of the contractors (Boucher's) men was knocked down, and very much injured, and waa taken to Bartholomew's Hospital, where he now lies.

"The main was broken right over where the explosion was said to have taken place; the breakage was a very bad one. The main was broken in two, and the parts were separated fully a quarter of an inch, and a great deal of gas must have been lost thereby.

16 November 1849.—"An escape of gas in Bartholomew Close, where the main of the water company having broken, a run of water ensued, and washed the ground from under the mains of this company, causing them to settle down and break, and a great deal of gas escaped in consequence thereof. Mr. Haywood, the Surveyor to the Court of Sewers, spoke about the Company's people pulling up the pavement as soon as it was put down by the Commissioners. I explained to him about the water-main breaking in Bartholomew Close, which seemed to satisfy him.

× 3. *Explosion in Sewer.*

20 June 1851.—"Mr. Haywood, of the Court of Sewers, sent to this Company a letter stating that an explosion of gas had occurred the day before, in the sewer in Aldgate, and by which a sewer man was injured; in consequenee of which I had our two mains in Aldgate, commencing from Jewry-street, on Friday night, examined, and found only one joint on the independent main leaky; stripped 280 feet, nothing more found:—also, Mr. Haywood sent, stating there was an escape of gas in the sewer in Long-lane. Our men opened on the Central's 8-inch main; also on our two mains, and found the whole to proceed from the former.

21 November.—"Jewry-street by Aldgate; escape. An old flange water-pipe found charged with gas—I expect from the sewer. On a light being brought near it, a sudden shock took place, extending across Aldgate.

9 September 1853.—"Bartlett's Buildings.—Our men were on Wednesday called out to an escape which, though unattended with serious results, alarmed the inhabitants by an explosion in a coal cellar, owing to Central's 2-inch main being broken.

× 4. *Explosion in Sewer.*

23 September.—"Crutched Friars.—On Tuesday night called up; large quantity of gas escaping: roused from their beds the out-door men to see to it at once. Quantity about 200 feet per hour: 3-inch main broken, and had been going on for some time: had found its way into an old sewer in John-street, Minories, where two of the sewer contractors' men had been at work on Monday morning: both of them much burnt: sent to Inspectors of Sewers: Central's main broken.

× *Gas not Exploded.*

1 December 1854.—"I have given notice to the police of a most alarming escape of gas ftom the sewer in Long-lane. I barricaded Long-lane to prevent the cattle, &c. passing through from and to the market: the houses near the spot were in a most dangerous state, arising from the large quantity of gas accumulated.

"This entrance of gas into the sewer arose from a main being broken in Long-lane.

Breakage from Intense Cold.

16 February 1855.—"I feel sure that I have seldom known any former week in which so much anxiety and harrassing labour have been encountered on several occasions. This week I have feared that most alarming explosions would have taken place, or injuries done to person and property; but with the exception of one explosion (which I understand is trifling) in Bartholomew-close, nothing of importance has occurred; the difficulties arose from the frost in the ground.

Private.—In consequence of the frost, there were not less than 22 mains and services broken or leaky—chiefly broken.

× 5. *Explosion in Sewer.*

2 March 1855.—Explosion in Sewer.—"3-inch main in Chatham-place, broken.

"It was attended with a loud explosion in the Fleet Ditch; it was heard by Mann on the company's works, and so alarmed the sewer men, who were in the Fleet Ditch, or

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sewer, that they took to their heels, and scampered away for fear of their lives. It was also so violent, as to throw, wide open, the large, heavy, iron sluce gates, by Blackfriars Bridge, and, for a moment, belched forth a volley of flames.

Gas in Sewer; no Explosion.

21 April 1855.—" Tower Dock.—3-inch broken.

" This last escape found its way into the sewer in Thames-street, and thence into private premises. It required the attendance of the men until late on Saturday night, and early on Monday morning.

Gas in Telegraph Pipes.

1 April 1859.—" The escape in Newgate-street has been, and is, of a most troublesome character; it is the more difficult to deal with, as the telegraph is highly charged with gas in the locality of Newgate-street.

8 April.—" Escapes from our independent main in Newgate-street, and which rendered the premises 46, 47, very dangerous; it was one of the most trying jobs of the kind; nearly the whole of last week was spent in a fruitless search for the cause. I deemed it of so much importance, as to continue the work, even on Sunday, and I hope it is quite cured.

" Another similar leakage is now following the telegraph wires down the Minories, as far as the Ratcliffs' mains; and both companies' men are at work stripping the mains by the City boundary.

Telegraph Pipes.

15 April 1859.—" On last Saturday I finished searching for the escape in the Minories; found it to have arisen from a leaky service belonging to the Ratcliff Gas Company.

6. *Explosion in Sewer.*

17 August 1860.—" Trinity-square: 2-inch leaky.

" By this escape one of the sewer men under the superintendence of the City engineer, Mr. Haywood, was injured (by an explosion) about his face. I have disposed of the matter by giving him (the sewer man) 20*s.*

Gas in Water Pipes.

" On Saturday last complaints were made that gas found its way into the water pipes in Earl-street. The New River Company have stripped some of their pipes and reset the points, thus removing the evil complained. Since then, our company, the Great Central, and the New River Company have been working together at and around Sir Robert Peel's statue in Cheapside, to find causes of the water being polluted by the gas into five houses. I remained at the trench until this morning, and have commenced stripping our Post-office and common gas mains, whilst the Great Central are examining their 14-inch main at the back of the statue. We are apprehensive the Chartered Gas Company also will have to join in the search; if so, the traffic into St. Paul's Churchyard from Cheapside must be stopped.

24 August 1860.—" Two leaky joints have been found on the Post Office main in Cheapside.

31 August 1860.—" Search continued; nothing found beyond the last entry. New River Company set up their joints; remedied the evil. On Wednesday afternoon, I took a sample of the water on its coming in at 1, Cheapside; found it perfectly free from the smell of gas.

7. *Explosion of Gas in Sewer.*

7 September 1860.—" I regret to state that one of the sewer men was injured about the face and hands by an explosion last Friday in the sewer, in John-street, Minories, arising from leakage as above. (John-street, Minories.—9-inch, leaky; 3-inch, broken.) I have had both mains repaired, and intend to examine them more minutely to-morrow before the daily traffic begins.

9 October 1860.—" Chancery-lane. Water fouled with gas.

Gas in Sewer.—No Explosion.

28 December 1860.—"Angel-street, St. Martin's-le-Grand. 4-inch main broken. The escape in Angel-street, which showed itself on Saturday afternoon, was so bad as to require my attendance with the men until three on Sunday morning. (From recollection, the gas found its way into the sewer, but no accident arose therefrom, 28th May 1864.)

29 November 1861.—"Billiter-street. 3-inch collar broken. Escape followed the line of a new sewer made throughout Billiter-street.

Telegraph Pipes.

20 December 1861.—"4 and 96, Cannon-street. 4-inch and 6-inch leaky. This last proved a very troublesome affair, as the gas travelled along and inside one of the telegraph mains.

Gas in Drains and Sewer.—No Explosion.

27 June 1862.—"Broken service at bottom of Benjamin-street. The drains in Turnmill-street, Cowcross-street, Pump-court, Peter's-lane, Benjamin-street, and Red Lion-street, were all visited by leakage, and some were in considerable danger."

4915. Did you give evidence upon the inquiry last year, when powers to make the subway were obtained?—I did not.

4916. You have told my learned friend that it has been recommended by you to make a considerable addition to your present existing supply?—In lieu of another supply.

4917. Have you yet seen any plan for conducting the pipes through the proposed subway down Mansion House-street?—No.

4918. Are you aware that no plan has yet been decided upon?—I am not aware of that.

4919. Does it not occur to you, that if the engineer puts himself in communication with you, you will be able to provide amply for all the pipes that you want?—I cannot say.

4920. If it is so arranged, will there be any difficulty then in multiplying the supply to any extent that may be requisite, if you are put in communication with the engineer?—We must run a big main.

4921. Supposing he runs a big main, or two big mains, the whole thing is yet undecided?—As regards the subway.

4922. No doubt as regards the admission of the pipe in that subway?—So I understand; but a big main must be laid, whether there is a subway or not.

4923. But supposing the subway is made, the big main will be laid in it?—I am not quite sure of that.

4924. Will it not be competent for the engineer in communication with you, to give you every facility that you require for supplying that district?—It is impossible to say yes, to that question, unless ——

4925. Is it possible to say no, to that question?—It would be a very great mistake to say no.

4926. My question to you is, is it possible to say no to that question?—I do not like to answer that question.

Examined by the *Committee.*

4927. *Chairman.*] How do you get your gas up to the Mansion House now?—This main (*referring to the Plan*) at present goes through Earl-street and up St. Andrew's-hill, and along that route; then along Great Carter-lane, St. Paul's Chain, St. Paul's Churchyard, and Cannon-street. It is to be a 12-inch main; it is 10 from that point, and it continues 10 throughout up to Gracechurch-street, and then it turns up Walbrook to the Mansion House.

4928. And then, if there are cross streets, it would still take it there?—No, I intend to do away with that altogether.

4929. I am asking you, as a question of pounds, shillings and pence, if you had to pay the interest for the construction of the subway, would you rather take

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it and pay 300 *l.* or 400 *l.* for the subway, or take it round as it goes at present? —We could not get a pipe through there; it is 18 inches that we want; it is only 12 inches now.

4930. Do you expect any very great increase in the consumption of gas in the City?—Not beyond a certain point; I believe this 18-inch main will meet all that is required up to the Mansion House.

4931. Why do you expect an increase?—We expect no increase in this portion.

4932. Why do you want the 18-inch main?—To supply the increased consumption of the new street. I proposed to have a 10-inch main on one side and a 6-inch main on the other.

4933. Would it require a 10-inch pipe to that straight line (*referring to the Map*)?—There will be a very high rate of consumption indeed. Judging from the present rate of consumption, I reckon that our rent in that street will be quadrupled, as compared with the receipts that we have along the whole line; the receipts at present are only 600*l.*

4934. Mr. *Holland.*] Your company is one of the companies which light the bridges?—We light Blackfriars Bridge and London Bridge.

4935. Mr. *Wilkinson.*] Those two only?—Yes.

4936. Mr. *Holland.*] Those pipes are uncovered?—Yes.

4937. Do you find that they alter much from the variation of temperature?—Yes, in time, most considerably.

4938. So that you are obliged to repair them?—Yes.

4939. Mr. *Wilkinson.*] The subway will remove all that?—It would bring a great many obstacles.

4940. Would not the subway be likely to produce a more equal temperature?—No; I think not. I think it will be the cause of a very great expansion.

[The Witness withdrew.

[Adjourned till To-morrow, at Twelve o'clock.

Martis, 31° *die Maii*, 1864.

MEMBERS PRESENT:

Mr. Du Pré.	Sir Baldwin Leighton.
Mr. Floyer.	Mr. Powell.
Viscount Grey De Wilton.	

SIR BALDWIN LEIGHTON, BART., IN THE CHAIR.

Thomas Hawkesley, Esq., sworn; Examined by Mr. *Burke*.

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4941. YOU are a Civil Engineer?—Yes.

4942. I believe that you are Vice-President of the Institution of Civil Engineers?—I am.

4943. I believe that you have made the study of gas and water as a matter of engineering, and it has been a peculiar study of yours for years past?—Yes, I have been in business, on my own account, as an hydraulic and gas engineer for 34 years.

4944. I believe you have had the charge of waterworks and gasworks in various parts of England?—Yes, I have. I have made about 40 waterworks in England, I think, and 20 or 30 besides.

4945. Among others, are you engineer to the Nottingham Gasworks?—Yes.

4946. Are you well acquainted with the city of Nottingham?—Yes; I am also engineer to the Nottingham Waterworks, and I have made both those works, which are very extensive.

4947. What may be about the capital that you yourself have had the superintendence and expenditure of in water and gasworks?—It is very large; I made the New Liverpool Waterworks—waterworks where there is the largest main in the world—24 miles long and 44 inches in diameter.

4948. Mr. *Powell*.] Are those the inside dimensions?—Yes.

4949. Mr. *Burke*.] There is no engineer in England who has had greater experience than you have had in the construction of water and gasworks, I believe?—I have had large experience, both in England and abroad; I am making waterworks at Bombay at the present time.

4950. I may ask, generally, whether you would not feel favourably disposed to my measure, which would facilitate the laying down of gas or water pipes, to avoid, as far as practicable, the breaking up of streets?—Decidedly.

4951. Were you one of the three engineers to whom the question of the main drainage of London was referred?—Yes.

4952. And was it upon your report that the present system is being carried out?—The three engineers were Mr. Bidder, Mr. Bazalgette, and myself; and our report was adopted by the Metropolitan Board of Works first, and subsequently by Parliament.

4953. Did the Metropolitan Board of Works also refer the plans of the subways to your consideration, as to which would be the best design?—I was on

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the Committee, to decide upon the persons to whom the premium for the best design should be given, irrespective of any question relating to the feasibility of subways as a system.

4954. I believe your Committee was unanimous in the choice that they made, were they not?—They were.

4955. Were you appointed to consider the principle involved, or the practicability of the measure?—Not at all.

4956. Did you form any opinion, at that time, as to the applicability of the subways for the accommodation of gas and water pipes?—I did.

4957. Was your opinion, at that time, favourable or unfavourable?—Very unfavourable, with respect to gas, and I held the opinion, in common with some other gentlemen upon the Committee, that it was a very doubtful measure, even as regarded water.

4958. You have no doubt whatever, as regards the impolicy of introducing gas pipes?—None whatever.

4959. Did the opinion of the late Mr. Robert Stephenson concur with yours?—The opinion of the late Mr. Robert Stephenson concurred with mine entirely upon that subject; at the same time it is right to say, that that question was not referred to us; it became consequently no element of our Report, and the conversations upon the subject must be rather treated as private opinions than as the opinions of the Committee, because the Committee, as a Committee, had nothing at all to do with it.

4960. You are of course aware that, since that period, subways have been constructed at Nottingham, as well as in London?—Practically, the only subways which can be said to have been constructed, of any magnitude, are in London, in Southwark-street. The subways in Nottingham can scarcely be treated as more than something like a model; the subways in Nottingham are, altogether, about twice the length of Westminster Hall. I doubt whether they are the length of this corridor, from one end to the other; that cannot be treated as being any example at all.

4961. Take the subways that have been constructed in London. Do you think they afford you any sufficient experience yet as to the applicability of those means of laying pipes?—The subways constructed in London afford nothing of what can be properly termed experience on this subject; they only show the form of a subway much as is shown on that drawing, but the occupation of that is exceedingly small; the time over which that occupation has extended is exceedingly small, and the collateral use made of it by the occupiers is exceedingly small. All those events which would result from complete occupation on a large scale have not occurred, and cannot have occurred, and therefore they do not afford any experience at all.

4962. So far as they have gone; so far as you have had an opportunity of investigating them, have they at all removed the objections you previously entertained for the use of them for laying gas pipes?—No; none of the subways have done more than this: they have shown that pipes can be put into a subway, and they have shown that the putting of pipes into a subway is not cheaper than putting them into the ground; that is all the information they afford at the present time.

4963. Do you think that at the present moment there is sufficient experience of the sufficiency of the subways for the purposes sought by this Bill to justify legislation for the future on the subject?—There is no new experience gained by the subways; all the experience that we had before, being applied to these subways, shows, in my opinion, that the subways are improper receptacles for gas pipes; but that opinion does not at all arise from anything that has occurred by reason of the occupation of these subways in the present manner, and to the present extent, our experience already exists; we want to know nothing with regard to what will be the result of putting gas pipes in the subways.

4964. Taking the fact that the subways exist in a particular locality, if the promoters of this Bill are right in stating that economy and convenience would be as great by laying in them gas and water pipes, would it be the interest of gas and water companies to avail themselves without compulsion of the facilities so afforded?—Yes; but I do not understand that it is so stated. I may be under a mistake, not having attended this inquiry throughout. I do not apprehend that it is stated that economy would be the result; it is put simply, as I understand,

understand, on the question of convenience, for as regards the economy there would be none.

4965. I gather from you that the present cost would be very much increased?—The present cost would be increased even if there were no rent paid and no rates paid. But I may mention, while upon that subject, this fact, that if these subways are made the subject matter of a rent, they will become rateable, and the Companies will be assessed for their occupation of the subways; that is according to law, and that could not be prevented.

4966. They are rented now in the occupation of streets?—Perhaps I may be allowed to explain something on the subject of rent. Suppose they pay a specific rent for the occupation of a subway, then, like the occupation of a house, the rent will become the subject matter of a rate.

4967. According to your evidence, I gather from you that without reference to their being rated, that the mere fact of laying a pipe in a subway instead of as at present in the streets would involve the Company in an increase of cost?—Yes; so it does. The pipes, although they are very much cheaper, owing to the peculiar circumstances, cost at Nottingham for putting into the subway more than they would have cost had they been laid in the streets. I have been the engineer knowing all about it, it having been referred to me when the request was made for the pipes to be inserted.

4968. Then, first of all, you have the increased cost in laying the pipes which would be imposed upon the Company; next you have a rent which is proposed to be charged in proportion to the cost of the subway?—Yes.

4969. And, lastly, they would be subject to rating in proportion to the rent?

The *Chairman* intimated that the question of rating need not be gone into.

4970. Mr. *Burke.*] Is it not a fact within your knowledge that gas pipes and water pipes are rated, to a very large extent at this moment, to their occupation of the streets?—Yes; and all hereditaments, whether placed upon another person's property, or placed upon the property of a person rated, they are legally rated. I have had a great deal to do with those questions.

The *Chairman* stated that this examination need not be pursued.

4971. Mr. *Burke.*] Your view is from your experience, that the Company would be put to an increased charge, and would suffer an increased rent which they do not pay now?—Yes; I stated that in answer to your question of the relative economy.

4972. This increased cost would fall upon the Companies in the first instance, and might affect their dividend?—Yes, of course.

4973. After they pay their maximum dividend, then the cost, I suppose, would fall upon the public?—It would so; it would fall upon the public in shape of the maintenance of an increased price of gas.

4974. In either event the result of laying the gas pipes in the subway would either be to diminish the dividends of the company, or to impose an additional tax upon the public?—Certainly.

4975. Do you think that these subways, according to the size which they are proposed to be constructed, will be adequate for the accommodation of gas and water pipes required for the supply of London?—They will not.

4976. Will you be good enough to describe why they will not be adequate?—To take a very satisfactory illustration, there are now in London about 3,000,000 inhabitants; I will take the case of the supply in a district containing only a twentieth of that number.

Chairman.] You had better keep to the streets; do not let us go out of these four streets; that is the subject for the Committee.

4977. Mr. *Burke.*] Take these streets; there will be the Thames Embankment, the new street to the Mansion House, the street in Southwark, and the street in Covent Garden. Looking to the supply, we will say, to the new street to the Mansion House, would anything like the size of the present subway be sufficient, in your judgment, for the supply of gas and water, and other pipes through

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through those subways?—It would not over a course of years; I dare say for the present it might be; it would become immediately very crowded with pipes; but looking to what is within my own knowledge of the increase of demand both for gas and water, but particularly for gas, which is much more rapid than with respect to water, I do not think that, supposing the subways to be made on the scale which I see before me, they would be adequate for the reception of all the pipes; it is very undesirable, and this is a most important part of the question, that the pipes should be laid over each other; of course it would be possible to lay the pipes in that way, but then it would be impracticable, or nearly so, ever to alter or enlarge one of the lower pipes without taking the upper pipe away, which of course would be impracticable, because it would stop either the supply of gas or water, or whatever might be the thing conveyed through it, for the time; and it would be intolerable to the public, and especially so as the work in the subways must be very much slower than the work executed in the open streets. Then, besides that, supposing any accidents to occur, and it is impossible that they should not occur; supposing a pipe to be dropped by the workmen, and the lower pipe broken, the instant that occurred, supposing it to be a gas pipe, it would not be so serious with a water pipe, the place would be immediately filled with gas, and that could not happen without the suffocation of the workmen there. I know a great deal about gas, and I can speak positively upon that subject. In the next place, the rush of gas could not be stopped, because a man would be utterly incapable of stopping it, and an explosion must some way or other ensue. It is quite impossible if you crowd pipes together in a subway, in the manner which has been suggested, that you should avoid these events.

4978. Then as regards explosion, can we have had hitherto an experience of anything like the explosion that would take place from the escape of gas in a subway?—Nothing at all of the kind. I happened to be present yesterday at the examination of that French engineer, M. Belgrand, and I heard him speak of the explosions that have taken place in the sewers of Paris; similar cases are within my own knowledge in England, but they only arise from the slow infiltration of gas through the ground; that is nothing at all comparable to the emission of a stream of gas from a large pipe, and consequently very little mischief comparatively arises from it. In the case of a direct outflow from a pipe, even of small diameter, the men round about would be immediately rendered perfectly powerless, and they would drop down just like shot birds. This is within my own sight and knowledge. In our trenches where we have been laying pipes and making a junction, that thing has happened again and again, and the men have had to be dragged out half a dozen at a time in a perfectly insensible and dead-like state.

4979. Without reference to the sufferings of the workmen, supposing an escape to take place in the subway, and, by any accident, a light to be admitted, might not the effect be to knock down the street in which the subway was laid?—We have the case of an explosion in Rosaman-street, in London, only a few years ago, which happened from gas getting into the sewer, and, I believe, it was set alight; there was some difficulty about knowing how the accident happened, but it was supposed to be by a cigar being thrown down one of the gratings. In that case, the explosion, although the sewer was a small one, was very serious indeed. It blew up a large length of the sewer and the street, and destroyed the windows of the houses; I do not recollect that there was a loss of life.

4980. Mr. *Powell.*] Did it blow up the pavement?—Yes; with regard to Wood-street, I was concerned in that matter, too; it was a serious thing; there was an explosion there, but it did not arise at all in the same way; I should not quote that as being analogous at all.

4981. Mr. *Burke.*] What is the explosive force of a certain quantity of gas mixed with six or eight times its bulk of atmospheric air?—I cannot answer as to the force; it is much more rapid than gunpowder; and gunpowder is at the rate of 7,000 feet in a second.

4982. If, by any accident, a considerable length of these subways was to be filled by an escape of gas into them, and an explosion were to take place, the effect would be terrific, would it not?—Yes.

4983. Is not the responsibility, therefore, enormous, of making it a compul-

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sion upon the gas companies, who are adverse to incurring those responsibilities?—I suppose Parliament, if it pleased to pass a compulsory measure of this kind, would insert something in the Bill to relieve the companies from those liabilities, because to force them in, and, at the same time, to leave them open to those risks, would be unfair.

4984. Supposing Parliament thought fit, as a matter of justice to the companies, who object to lay down the pipes, to relieve them from the responsibility, they being compelled to lay them down, would not there be an enormous responsibility still, as regards the public, by adopting this mode?—With regard to subways constructed in the manner shown on that drawing, the consequences would be very serious, because those lateral galleries are gas traps, in fact, and they would put the gas in precisely a similar position to what it would be in a coal mine. There is no ventilation in those lateral galleries, and very little in the longitudinal gallery. Supposing the subways to be horizontal, there could be, in point of fact, no ventilation in the subway, at the time that the air was colder in the subway than in the external atmosphere, because the cold air is a heavier air, and will always lie at the bottom; there will be no ventilation whenever the air is colder in the horizontal subway than it is in the open atmosphere.

4985. Did you hear what M. Belgrand stated about the ventilation of the subways in Paris; the ventilation in Paris is taken more pains with than is proposed in the present instance, and yet what you state occurs in Paris?—There can be no ventilation unless it is produced by artificial means, such as by having a fire to create a draught, or by having a machine constantly going for the same purpose. With regard to the fire, I consider it quite out of the question, because even in this house within my own knowledge, for I was present at it, an explosion took place from the admission of gas from the sewer into the clock tower. A very sharp explosion occurred, at which I was present myself.

4986. I am glad we have no subway near us now, or you would make us tremble?—I ought to explain, and it is important to give that explanation, that the subway is, in point of fact, nothing more than a dry sewer; it is just as if you were distinguishing between a river and a torrent.

4987. According to your evidence, I gather from you that unless by artificial means, by fire or otherwise, you create a current through the subway there will be no ventilation?—There is no ventilation in the horizontal subway under those circumstances. When a subway is inclined there will always be a certain amount of ventilation, excepting when the temperatures are precisely the same within and without; in that case, whether it is inclined or whether it is horizontal, there will be no ventilation, but as that seldom happens there will always be some amount of ventilation, excepting when the subway is nearly horizontal; but there will be a great number of nearly horizontal subways in London, because the majority of streets in London are very flat; the four streets which we are discussing are very flat; the Southwark street is an exceedingly flat street, there is very little inclination in Covent-garden, and there is not much inclination between Blackfriars Bridge and the Mansion House.

4988. There is not sufficient inclination to create the current you talk of?—No; the current, to keep up the ventilation, so as to prevent explosion, must be a quick current. Any current that could be established, would be of no use in the case of accident, when a large volume of gas has been let out.

4989. As to these lateral channels for supplying gas to houses on either side, would there be danger from the admission of fire into the cellars, or other places with which these communicate. Suppose there is an escape of gas in a subway, would not that gas find its way, also, to these cellars adjoining, by means of these lateral channels?—I think if the work were well done (but that is an exceedingly difficult thing to secure), if it were well done, and all the apertures were well stopped, and the ends of the walls were plastered, and all that sort of thing done, then the gas might be prevented from passing into the cellars; but I doubt whether all those niceties of operation would be secured, and whether they would be kept up and maintained constantly.

4990. Notwithstanding every precaution being taken to prevent the escape of gas, which all persons desire, the gas does escape in large quantities?—The escape of gas from main pipes is not nearly so large as many persons suppose; it certainly does not exceed 4 or 5 per cent. The unaccounted for gas, as it is called, and which usually passes, for abbreviation sake, under the name of

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leakage, varies from 10 per cent. to as much as 25 per cent.; but the gas which leaks actually from the joints of the pipes in the streets, certainly, in bad cases, does not exceed 4 or 5 per cent.

4991. When an escape takes place at present from the gas pipes laid in the street, there is no immediate danger resulting from that until it exudes into some cellar or place where light can be admitted?—At the leak there is not any possible danger, because the soil is the most perfect safety-lamp that it is possible to have; the gas, which does escape, infiltrates very slowly through the soil; it is impossible to ignite it through the soil, or to carry the ignition of it down to the pipe; it filters through, or infiltrates gradually, and that smell which is perceived, is simply occasioned by the residue of the infiltration of which is left behind; it is almost like the filtering of water.

4992. Practically, the experience afforded hitherto, shows that the amount of damage or accidents arising from explosion is very small in London?—Very small indeed; and that arises as distinguished from Paris in this way, that the London sewers are all so laid as to drain the basements of the houses, and are very much deeper in the ground than the sewers in Paris, and the gas does not get down so low into those sewers. There are instances of gas getting into sewers, where they are extremely shallow, but as a rule the gas does not get into the sewers.

4993. Practically, in comparison to the enormous amount of gas consumed in London, the amount of accidents arising from the supply is exceedingly minute?—Yes.

4994. So far as experience should guide us, we might state that the present mode is a fit mode for supplying gas?—The accidents which arise are chiefly within the cellars and low stories, and most commonly from some leakage or defect in their own pipes, rarely from anything that comes into the house from the streets

4995. By present experience we are adopting a safe mode, and according to your evidence, and that of other engineers, by adopting that proposed, we should adopt a mode exceedingly unsafe?—My opinion upon the subject, and I am sure I am quite unprejudiced in expressing my opinion, is that it is exceedingly dangerous to introduce gas into any underground vault, that is, on a large scale.

4996. Do you know that it is proposed merely as a substitute for the breaking up of the surface of the streets. You know, probably, that the gas companies have divided London into districts, and each company supplies its own particular district?—Yes; I do. I was concerned on those investigations.

4997. Heretofore, where there have been several companies in one street, there has been frequent necessity to open the streets to discover the escapes, not knowing from which pipes the escapes emanated?—Yes.

4998. The necessity for the future opening of the streets will be much smaller than it has been?—Yes.

4999. Supposing the new street under the control of one company, and the Thames-street, and the street to the Mansion House, or one company, that one company will require only its one or two mains, one on each side of the street?—Yes; but I think you have now drawn my attention to the only case in which the districting is not perfect. In the City it is exceptional; there are three gas companies working in the City, but in other parts of London the districting system applies.

5000. In the new street to the Mansion House, if that is within the district you refer to, you must admit the Consumer's Company, the Chartered Company, as well as the City Company into this street?—The City Gas Company, the Chartered Gas Company, and the Consumer's Company.

5001. And in addition to that, there would be the water companies; and besides the other companies, there are telegraph and atmospheric despatch companies also?—Yes; I measured the atmospheric despatch tube the other day, and I found it took five feet over the sockets; it took five feet in width, and five feet in height. Then there must be room round to make a joint; that is the parcel's tube that I have spoken of. Besides that, there are other tubes proposed of nine feet diameter, for the purpose of carrying passengers through.

5002. There are three gas companies in this new street to the Mansion House; how many water companies will there be?—The New River Company, I think, is the only one there.

5003. Taking the large amount of population that you find in a street of that kind,

kind, what will be the capacit yof a main that will be required for the pipes of one company?—It is very difficult to state precisely what would happen, but it must be a street either of large shops or large warehouses, or both; and necessarily so, because, if it is not so, it is a street which is very little wanted; my observation does not apply so much to water as to gas; the consumption of gas must be enormous. But, in addition to that, the City Gasworks happen to be at one end of that street, and they will have to convey their gas, not only for the supply of that street alone, but they will have to convey their gas in the most direct way into the heart of the City.

5004. Now, we have three gas companies and a water company; what would be the size of a main that the water company would be required to lay?—The New River Company, I should think, could not do with a main of less than 18 inches diameter; besides that, they would want some service pipes, because the mains, as probably you are aware, are not tapped for service pipes; if they were, whenever any little repair was wanted within a house, it would be necessary that the main should be shut off; to avoid that, other mains are laid parallel with them for the purpose of supplying the houses; that does not apply in the same extent to gas as it does to water.

5005. The water company would require more than its main?—Yes. Supposing that restriction to be obtained, the gas company would require, at least, two pipes.

5006. Each gas company would require two pipes?—No; I do not know whether each would require two pipes; that would depend upon how many would be in the street. One company would, no doubt, have a leading main and one service pipe, at the least. Another gas company might only have a service pipe for the street, or a leading main a part of the way, and the leading gas company might have both.

5007. Can you give me any notion of the size of the subway that would be required to accommodate all the gas and water pipes, and, in addition to that, the Pneumatic Despatch and the Telegraph Company?—What would happen in that case would be this: the only way of making a subway for that street would be, to do away with the five passages altogether, and make three arches; that is the only description of subway, I believe, that can be made in any large thoroughfare in London.

5008. The cost of that would be very large, would it not?—The cost would be larger; but there would be some saving, inasmuch as those side-passages, which I regard as a dangerous thing, would then be done away with.

5009. Is it not the fact, that as gas has gradually been cheapened in price to the consumer, that the consumption has gone on increasing very rapidly?—Yes, it is; and at the present time the consumption amounts, on a winter night, to 12 cubic feet per head on the population, and it is gradually growing. It has grown from five cubic feet to 12 cubic feet per head, and what it may grow to, it is impossible to say, as gas becomes cheaper.

5010. Looking at that, there is a funnily worded clause put in this Bill, that it shall be the duty of the Board of Works to increase their subways from time to time; that means every time that the Gas Company wants a bigger pipe they must increase the subway?—That is a manuscript clause recently proposed, but it is perfectly impracticable, because it would be intolerable for a leading thoroughfare made by the Board of Works to be entirely shut up to make a new subway or to alter it.

5011. It is impossible, is it not?—It is not impossible physically, but it is impossible having any regard to the convenience of the public.

5012. *Chairman.*] Economically you mean?—Not merely economically; it would shut up the shops and destroy the approaches to the warehouses, and in fact it would be so intolerable that the public would not submit to it. No public body dare do a thing of that kind.

5013. Mr. *Burke.*] Supposing the gas and water pipes were to be laid, I suppose constant inspection would be necessary, would it not, to prevent danger?—You must have two classes of inspection. You must have the inspection of qualified and competent parties to look after the workmen, and that must necessarily be imperfect, because with all the care that inspection can bestow, workmen of an ordinary class will either be careless or their judgment upon many subjects will be unsound, and, in consequence, accidents will arise, it being perfectly impossible to prevent them. Then, you must have another kind of inspection

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which is, in my view, still worse. You must have police inspection in a place like London, where the thieves are so clever. They will get into the side passages and conceal themselves there, and they can easily work their way into the houses. You dare not trust valuable property in subways of this class without having inspection; the workmen are of all classes; you cannot make the workmen particularly honest, and you cannot prevent other people having designs of that kind from mixing themselves with the workmen.

5014. The inspection will be constantly necessary; do you think it will be an easy thing to inspect; for instance, you will require light?—Of course you must have a sufficient number of safety lamps to light the place when it is being inspected.

5015. Must not that inspection be pretty constant, in order to prevent accidents?—Yes; you must have a day and night inspection, of some kind, if the subway system is to be carried out to any extent; or unless it is only to be a small thing, such as it is in Nottingham, with two 4-inch pipes in it. I heard here they were called 6-inch pipes; they are nothing of the kind. There is one 4-inch water, and one 4-inch gas pipe in the Nottingham Subway, and I believe there are two 6-inch pipes in the Covent Garden Subway. But if you had a tolerably general system of subways, of course the nature of the thing is altogether altered. You have the overground London, and the underground London; both must be taken care of.

5016. Of course, the cost of inspection must fall upon somebody?—Yes.

5017. It must largely increase the cost to the public, or the companies, having the subways?—Yes.

5018. Again, the companies constantly require, do they not, for the purpose of supplying new services, or stopping old services or making alterations, to have access to the mains?—Yes.

5019. And to conduct the works there?—Yes; they must have access to the underground mains, just as often as they require to have access to the overground. You know what those are, because you have returns of them; but I think that they have been larger in number, during the last four or five years, than they are likely to be hereafter, because the streets have been pulled up, to a very great extent, under the Act of Parliament, I think, of 1860. They have been pulled up very extensively for the purpose of districting the companies; separating the pipes, and making fresh junctions, and dividing off one system of supply from another. Therefore, I consider that hereafter there will be fewer openings of the streets to some extent.

5020. Irrespective of that, every day's experience shows us that the companies who work in all streets from the change of tenancy, and other reasons, have to cut off gas, and put on fresh services, and deal with the mains?—All that, of course, must be done in the subways, just to the same extent as it is done in the streets now.

5021. For the joints of pipes it involves lead, and fire for melting the lead?—Yes.

5022. Do you think that those operations can be conducted securely in the subways?—They would not be conducted securely there, more particularly with regard to certain particulars which I stated before. You must let in, some way or other, the melted lead; the lead must be melted in the street above, and let down for use below.

5023. Let us suppose this case; I do not think it is a very violent supposition that, in tapping the main for the purpose of the service, a sudden rush of gas should be produced; I suppose the very first result of that would be that the men would run away?—There will always be below, as above, a rush of gas at the moment of putting the pipe into its place. I am quite aware that it is quite possible to drill a hole without any escape of gas.

5024. You mean with great care?—By an instrument made for the purpose; but that instrument must be removed, in order to put the proper pipe into its place, and, at that moment, there will be a rush of gas.

5025. We cannot always be sure of perfect skill in the workman; and let us suppose that even a skilful workman took a little too much beer, or let us suppose any circumstance of accident, which is not unlikely to arise, by which there will be a sudden rush of gas, would not the necessary instinct of self-preservation make the man escape, and the gas go on filling the tunnel?—Unless it were from a small aperture, upon which he would put his hand; his own natural instinct would

would lead him to stop it with his hand; if it were a larger one, he would run away as quick as he could.

5026. These are possible contingencies, arising from want of skill of the workman, or other circumstances which may cause a large escape of gas, which, in the street, would not make any damage, but, here in the subway, would be disastrous?—If your own footman has to bring your tea-tray every night, after a certain number of days, he will fall down, and break the tea-things; accidents will happen, against which nobody can provide.

5027. With reference to placing pipes, I suppose there must be adequate space round every side, to allow an access to the pipe for repairs, or additional services, or any other purpose?—Yes; a man has, as a rule, to sit astride the pipe to caulk it in this way, with a hammer, all the way round the joints; and then he has to place himself between the pipes, to get to the lower parts of the pipes, and there must be, of course, a sufficient space for him to do so. Perhaps he can do it badly in 15 inches; but there must be just sufficient space for him to do it.

5028. That is done at present, with perfect ease, in an open trench?—Yes; the trench is cut in this way of uniform width, for nine feet. Then there is a small aperture of a wider description, which is made where the joints come. The man performs the operation I have indicated, in that aperture, and then it goes on again at that width till it comes to the next joint (*explaining the same to the Committee*).

5029. Supposing there to be a great many pipes in this subway, would not this operation be attended with very great difficulty?—Just the difficulty that I have indicated. You must have all that space round the pipes; and if you mean to have tolerable safety, and the means of alteration and repair, you must not put one pipe over another.

5030. Supposing they were laid as is proposed in the subway, one over the other, and you had to remove or alter an under pipe, would not that be extremely difficult?—Yes.

5031. With the heavy pipes in the streets, they lower them by shears, or some mechanical means which they have, easily?—Yes, they are hung by chains, and lowered by pulleys.

5032. They have a perfect command over the contrivances?—Yes.

5033. Could they use these appliances in the subway?—No. I suppose there would be a gang-way, with rails down the centre, and there would be a sort of crane, or something of that kind, which would swing round and bring the pipe into its situation; that is the most feasible, and safest way of doing it; but, nevertheless, any slip would be attended by the fracture of the pipe.

5034. To adopt the methods you have suggested, it must be, where there are sundry pipes, a very capacious subway?—Yes, that subway is not large enough for the main streets of London; but it will do, with the exception of cost, in the minor streets; but where the mains in those streets through which it is necessary that the mains of any of the gas or water companies should proceed, I consider it too small.

5035. I think you told us, Nottingham affords no sort of criterion of the feasibilities of this proposal; in Nottingham, have you gas and water pipes laid in a small subway?—Yes. I was applied to as the engineer of the company upon the subject, and the companies, were, of course, as was natural, very averse, and particularly the gas company, to putting their pipes in the subway. I said, "Well, the Corporation have built this subway, it is a very small one, and there will probably be no more made, and as we do not want any leading mains down there, I advise you for peace and quietness to put your pipes in, and satisfy them; they will consider you are very refractory, and that you have opposed them very unnecessarily; it is so small an instance that I do not think it worth your while to make yourselves unpopular upon that question." Thereupon, my own assistant, who is now in the room, who put these pipes into the subway, and they cost a little more being put into the subway, than they would have cost out of the subway.

5036. What is the capacity of the pipes?—They are both four inches in diameter.

5037. Do they exceed double the length of Westminster Hall?—Double the length of Westminster Hall, the entire thing. I ought to mention this, because it is really very important in a question of this kind. It is on a steep hill, and,

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that weighed with me very considerably in making my recommendations; in that very short length, it rises 27 feet.

5038. Do the Corporation charge any rent for that?—No.

5039. They allow you to lay the pipes there without paying rent?—They asked us to put the pipes there; it was done by their suggestion, and against our own inclination; but I thought, and think still, that it was a prudent thing to consent to their request.

5040. Do you think that that affords any criterion that there is any sufficient experience, whether in Nottingham or London, to justify anybody in coming to the conclusion that these gas or water pipes could conveniently be laid in a subway?—No; but we have plenty of experience, because a subway is nothing but a gallery in a coal mine, and it is a gallery which is not efficiently ventilated as a coal mine is. In coal mines they send from 15,000 to 60,000 cubic feet of air per minute, by either mechanical appliances or by having a large furnace at the bottom of a shaft, to create a draught.

5041. I gather from you, that the result of your views, as an engineer having great experience of these matters is, that the gas pipes could not be laid, in your judgment, in subways, without at all events a very great chance or probability of serious accidents arising from them?—To my mind it does not present itself as a probability; the event is sure to occur.

5042. And in addition to that serious responsibility, there is the other certainty that they could not be so conveniently laid, or so conveniently had resort to, as when laid in an open trench?—That I say, because no workman can work in the dark with the same facility, or do his work so well, as he can in the light of day.

5043. And further than that, I gather from you also that the first cost of laying the mains, irrespective of the rent to be paid afterwards, would be much greater than the present process?—As a rule, not so much so with reference to the smaller pipes as with reference to the larger pipes; but the first cost of laying will, I believe, in all instances be greater, that is to say, if the companies have to find the chairs and other appliances that are incidental to the mere laying of the pipes.

5044. Then, the suggestion would appear to be that, whereas at present we have a safe mode, and a tolerably economical mode of laying our pipes, we should hereafter adopt that which you and other engineers think to be unsafe, and certainly more expensive?—Yes; the present mode is a safe mode as respects the gas and water; it may be attended with some occasional public inconvenience.

Cross-examined by Mr. *Phinn*.

5045. In the first place, are you of opinion that we must give up all notion of alleviating this breaking up of the streets?—That is my opinion, most decidedly. I think there might be better arrangements, and the inconvenience might be very much mitigated possibly; but that observation applies still to laying the pipes in the streets, and the manner in which they are now laid.

5046. Do you think that the subway is a good thing for the telegraph pipes?—I think it is quite immaterial with regard to the telegraph pipes. You have upon your own drawing there indicated all that is necessary for the telegraph pipes, which is simply that little aperture through which you propose to put the additional service pipes, to light all the lamps. There is a little aperture you will observe here (*pointing to the Diagram*), that will take all the telegraph pipes that are needed.

5047. What are your objections to it for water pipes?—First of all, that it is exceedingly inconvenient to lay them there; in the next place, it is exceedingly inconvenient to alter them there; in the third place, you cannot keep out of the water pipes under all circumstances the foul air which would be in those sewers. And then there is a thing which I have not mentioned yet, and which really weighs with me almost as much as anything, and that is the extreme difficulty of making the connections at the intersections of the streets. Supposing that this street is intersected here by another street, and that down the other street there is almost an equal number of pipes (it is immaterial whether they are equal or otherwise), and to get all these pipes crossing here in all imaginable ways,

ways, perhaps a dozen of them, is almost impracticable, and the whole thing would be blocked up.

5048. Had you all these notions when you signed this report about subways, and selected a plan?—We had.

5049. Did you select a plan very nearly identical to our present plan?—As nearly as possible, because it was the best amongst the whole. What I stated, and what the other gentlemen stated distinctly, was that we thought the whole thing was unfeasible, but that was the best mode of doing it, nevertheless.

5050. There is your report; find me any expression of opinion upon it?—That was not referred to.

5051. Is there any written expression of opinion on your part in that report that the thing is unfeasible?—Not the slightest; it was considered whether we ought, having regard to the reference to us to express any opinion, and it was thought it was not within the terms of the reference.

5052. If you thought it unfeasible, how did you come to write this: "Your Committee have therefore selected those designs which appear to them most susceptible of such practical adaptations as would render them most generally applicable to the circumstances of the metropolis"?—That is very easily explained: "Most susceptible of such practical adaptations as would render them most generally applicable to the circumstances of the metropolis." We did not think any of them were applicable, but we thought they might be adapted so as to remove some considerable number of the objections which were apparent on the face of them. I am enabled, because I discussed all these with Mr. Robert Stephenson at his own house, and at several other meetings, to state what was the opinion of that gentleman as well as myself.

5053. These are your own words?—No, they are not. Every person who is a member of a body must consent to concur in some terms of language with the others, and therefore you cannot be critically objecting to every expression. We could not get on at all if that was the case.

5054. Do you think that the principal subject to improvement might be adapted at the exigencies of the metropolis?—Only in exceptional cases.

5055. Will you tell us the exceptional cases?—With regard to New Mansion House-street, I think it is quite possible to get rid of many of the objections which appear on this plan, if you would only arch in the whole of the street. I do not say it would remove the objections as regards explosions, but it would mitigate them; there would then be room to place all the pipes, and there would be room to receive those additional number of pipes, and those enlarged pipes, which I am certain would be wanted hereafter. I think it is capable of being improved.

5056. How often have you been down the Covent Garden subway?—I never was down it at all; I saw it in the course of construction; but I never had occasion to go down it for this or any other purpose.

5057. Have you been down the Southwark subways?—I have not been down them; it is wholly unnecessary; I have seen them in the course of construction, and know all about them.

5058. With regard to the two other subways which the Bill applies to, they are not yet made?—No.

5059. The Board would make them, and would be ready to receive suggestions from you learned gentlemen?—I have no doubt the Board will give every consideration to every suggestion that is made to their engineers upon the subject. I have nothing to say against the Board of Works The Board wish to do the thing in the best possible way.

5060. If you have never been down the Covent Garden subway, are you qualified to judge of the ventilation or the the temperature there?—Yes, I have been down plenty of miles of sewers, in the course of my life. I do not want to go down Covent Garden subway, or any other you could name, for that purpose.

Re-examined by Mr. *Denison.*

5061. I understand you to say about that report of yours, that you considered none of the then present plans applicable, nor were you prepared to suggest any plan that would be applicable to the general circumstances of the case?—You misunderstand me; we were not appointed to consider any plan, with a

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view to its applicability, that is to improve upon it, or to make any suggestions. The Board advertised for schemes for making a subway—about 100, I think it was—but an immense number were sent in, and they asked a certain number of gentlemen to consider those plans, and to select three or four which were the best, in their opinion, in order that the Board might give them the premiums which had been advertised, and with that our duty ended.

5062. My learned friend read to you one passage in this report. I will just remind you of another passage immediately before it: "The difficulties in the way of arriving at a satisfactory decision have been very great. No general principles were found to apply, nor was it possible either to approve or condemn all the parts of any of the designs submitted to competition." That was the case, I suppose?—Yes, that is only within terms; I have expressed the opinions of the Committee.

5063. You had no occasion, then, to consider, in that case, how communications should be made between pipes in any particular subway and pipes in the adjacent streets?—We had not; but that did not escape those persons who were practically concerned in laying gas and water pipes. We, amongst ourselves, talked it over incidentally when we were looking at the plans, and made such observations as this: "Well, how is it possible to make junctions, and so on;" but we had nothing to report upon with regard to that.

5064. *Chairman.*] Has there been any accident in Nottingham?—No; there is only one gas pipe in the subway of four inches diameter; there is one side of the street, with the exception of, I think, one house, wholly unbuilt upon, and on the other side, it is only partially built upon; I think I can give you an idea from a sketch.

5065. Will that pipe be sufficient when the street is built upon?—Quite sufficient, because there are other mains with which it is connected at the two ends, so that, really, it is only for the conveyence of the gas to that part of the street.

5066. Is that longer than Covent Garden?—I should think the two streets together would be about the same size. Speaking from memory, I think the two streets together are 170 or 175 yards long.

5067. How long have the pipes been down in Nottingham?—I should think 18 months. There are very few services off them; there is no communication of any kind.

5068. Has there been any leakage?—I think not.

5069. How often are they examined?—My assistant will tell you that; he resides on the spot; I reside in London, and he will inform you exactly.

5070. You have told us it is very costly?—No; for laying a small pipe, it is a smaller cost.

5071. You have told us the inspection is very costly?—I said the inspection in London would be very costly, with all these numerous pipes, and a great many companies' mains in them, and the immense number of workmen to be employed. We have no workmen to be employed, except occasionally, in that subway.

5072. Take, for instance, the Southwark-street subway; it is really absolutely necessary, I imagine, for the companies to put down mains for the supply of Southwark-street?—That I cannot answer without knowing whether the companies are proposed to carry any water or gas beyond the street.

5073. It is within your knowledge, I suppose, that they can take their water and their gas, as they do now, along some other streets?—Yes.

5074. Then it is really absolutely necessary to have sufficient room?—Yes.

5075. Therefore, if they take it through that subway beyond, it would be for their own convenience?—No doubt.

5076. Do you think they ought to pay for that convenience?—I should say Yes, under some circumstances, and, No, under others, and generally, No; for this reason, that they have now the power and the right to lay their pipes down all streets, and their charges are fixed with reference to those circumstances. The water companies are in a different position to the gas companies; the gas companies have the power to lower their prices, and within certain limits to raise them. When they get their 10 per cent., which they are, most of them, getting now, they must lower their prices by an Act of Parliament; the consequence is, that if the gas companies have to incur greater cost the public would be charged more; they would not get these reductions to the same amount, and the cost would fall upon the public. But it is not so with the water companies; the water

companies are not supplying a manufactured article, and they have not that same scope with regard to the increase of revenue as the gas companies have; that makes a great difference.

5077. Is the water companies' charge fixed by an Act of Parliament?—Yes; it is fixed, the rates are limited by an Act of Parliament, they are limited in a different way. No increase of consumption will give the water companies more rates from the houses; these rates are fixed by the house rents, and whatever may be the increase of consumption their charges must remain the same. But with regard to the gas companies the opposite occurs, and all the gas supplied is measured by meter, and as there is an increase of consumption, so there is an increase of income.

5078. But if it is more convenient for the companies to lay their mains through these new streets where they are not obliged, you consider they may pay something for that convenience?—I do not say so for these reasons, that these are as much public streets as the others, and the duties and obligations of the companies with regard to the supply of those streets are precisely the same as with regard to the supply of other streets.

5079. You are arguing what the law is; the Legislature may alter that law. Supposing there is no law, they would not take the mains through these streets without it is more convenient?—If it was a gentleman's own private land they would have, as a matter of course, to agree with that gentleman.

5080. And to see which is the most convenient?—Yes.

5081. Viscount *Grey de Wilton.*] Supposing the Board of Works were to construct in the new Mansion House-street a subway of the size you were suggesting, that is to say, sufficiently large to accommodate all the gas and water pipes likely to be placed there, do you think that a safe ventilation might be introduced by artificial means or by a furnace?—I think in that case it would be possible if all that were made one vault, and a sufficient number of openings were made, that the ventilation would be tolerably good without any artificial means whatever, excepting in the case of accidents.

5082. Supposing a case of accident, would there be space enough in an enlarged subway for an artificial system of ventilation which would secure the public from injury?—Yes; but I think it could scarcely be established with a view to accidents alone, because the cost of any artificial system of ventilation to be kept up constantly, the chance of an accident occurring once in 12 months, would be so serious that it alone would be a great objection to the subway system altogether. I think that would scarcely answer any view of the case.

5083. *Chairman.*] You have changed your opinion since you gave your advice to the Nottingham people, that for the sake of peace and quietness, the gas companies had better agree to this. You advised the Nottingham people to consent for peace and quietness, did not you?—There was no inquiry there; it was not a thing to be inquired into by a Committee of this Honourable House; if it had been inquired into by this Committee, I should have given the same opinions that I am giving now. Here was a subway made; the whole thing was a very small affair; the Corporation were very importunate, and for the purpose of avoiding any local disputes upon what I considered so small a matter, I advised that it should be done; but at the same time I stated, "I think this will be last of the subways that will be made here, and that by complying in this case, we may get rid of all the unpleasantness of discussion, and, at the same time, have no future difficulties."

5084. You could not have had much idea of the danger of blowing up?—With a 4-inch pipe, and a subway of 170 yards long, and a difference of level of 27 feet in so short a length, of course the risks were reduced to a minimum. I do not say there is no risk, because I believe there is, and I have frequently stated with regard to that subway, that some day or other they will have an explosion, and then there will be an end of the whole business; but I do not think it is a very material thing at all.

5085. Viscount *Grey de Wilton.*] I suppose you were looking for peace at the municipal election?—I have nothing to do with elections; but the difficulties which arise are from the perpetual agitations which are introduced in the town-council; and, as far as I can, in my own management, I avoid that; but on all important occasions I am as firm as possible.

5086. Mr. *Powell.*] You know the Hindley Station upon the Lancashire and

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Yorkshire Railway, where a pipe from Livington is laid across a deep cutting?—I laid that myself.

5087. Can you inform the Committee what has been the experience gathered from that experiment as regards leakage?—At that particular point, and it is the only instance in the 24 miles; at that particular point, the pipe is a wrought-iron pipe, and is put together in a very peculiar way, in order to allow not merely for expansion and contraction, but for the subsidence of the ground in the case of the coal being got underneath, and it certainly happens there at this moment that the coal is being got; for we have received a notice from the coal owner that the coal is going to be got under that bridge.

5088. As a matter of fact, has there been leakage?—Not within my knowledge; there may have been, but that would not say much for any of these cases, because the joints are made there in a peculiar way; they are not the ordinary joints of pipes, but they are expansion joints. There has been great leakage down Hindley, arising from settlements produced by getting coals, and those leakages have from time to time been stopped as they have occurred. The Earl of Ellesmere has been working out some thick pits of coal between Hindley and Platt bridge.

5089. Has there been a great increase of expense from the special appliances made use of to work where the iron tube crosses the railway?—A great increase of expense, but it was a perfectly special case, more special than anything that could occur in a subway.

5090. Should you despair of creating sufficient ventilation in the subway of the Thames Embankment, by opening shafts into the river. We are told it is to be close to the river side?—My own impression is, that it could not be done there, because I think that the water rises to a higher level than the openings could be made at.

5091. The openings might have an upward tendency?—I thought you meant through the river wall.

5092. I did; but still they need not be horizontal; they may slope, and be above high-water mark?—I should think upon the Thames Embankment a vast number of openings of one kind or another, both immediately over the subway and through the lateral chimneys, or whatever they might be called, could be formed: and I should think that those would be sufficient on all ordinary occasions; but they would not be sufficient when the internal air is colder than the external air, for it will always lie dead in the subway, being heavier, unless the subway is inclined, and then it will run down hill precisely like water, and come out below, instead of coming out above.

5093. How far can you carry the molten lead from the fire to the place where it is employed?—I should think a quarter of a mile easily enough; I do not see any difficulty; there is considerable inconvenience, but there is no actual difficulty in getting the lead into the subway, provided there were proper passages and galleries along which such a heavy vessel as a vessel for molten lead could be carried.

5094. Do you know how the gas pipes are laid in the Thames Tunnel?—I forget whether they are wrought iron or cast iron.

5095. Are they laid under the ground, buried, or are they upon the surface?—I cannot charge my memory with that.

5096. Do you believe that leakage of gas takes place through the metal of the pipe itself?—No; where the pipes are porous, that is, imperfectly cast, the gas does come through, but where the pipes are perfectly sound, undoubtedly it does not.

5097. Viscount *Grey de Wilton.*] But cases often occur in which there is an unsound pipe laid without any possibility of discovery?—Yes; I give that opinion with confidence; I feel it my duty to give it; I have put the gas pipes two or three inches under water, and I have put a heavy pressure of gas in the inside; there was no exudation, no bubbles come up through the water, and, therefore, I do not believe in the exudation of gas through a solid metal, but, undoubtedly, it does come through any porous places which may happen to exist in the pipe.

5098. Did you do that by way of experiment, or to test the pipe?—By way of experiment.

5099. I suppose it would be a safe way of testing the pipe?—Both gas and water

water pipes are tested in a better way than that; the pipe is filled with water, and a pressure is put upon the water by means of a pump, to the extent of about a column of water of 300 feet, and if the pipe is not sound, or is liable to fracture under that pressure, it manifests itself then; but still many really porous pipes do unquestionably escape detection, because the workmen who cast the pipes are all paid, not for the unsound pipes but for the sound pipes which do act and pass; at the pumps they do practise all manner of deceptions as well as all manner of tricks. I have had this; I have had the unsound pipes carried, in the night, back again to the place where the sound pipes were put; they practise all manner of things, and with the greatest care you cannot prevent tricks being played.

5100. Is every pipe tested?—Every pipe is, or ought to be tested. We do our best, and we even place an inspector at the foundries; but for all that we meet, after the pipes are put in work, with many defects.

5101. Mr. *Floyer.*] Supposing these compulsory powers to be granted, do you think it probable that the companies would take their pipes along the new embankment of the Thames, or prefer to put them in the old line of streets, the Strand and Parliament-street. Of course, I mean except the service pipes for the lights on the embankment, because those must pass along the embankment; but for the other general service pipes, do you think the companies would take them along the new embankment, or along the streets I have named?—I think they will be bound, under their Act of Parliament, to do more than what you have supposed to be within their mere option, because there must be houses and warehouses, and many occasions for gas besides the mere public lamps, which they will be bound to supply. They must do more than merely carry a pipe for the supply of lamps through the subway. Excepting with reference to that, they will prefer undoubtedly to go through the public streets, where there is room for them to do so; but with reference to the Thames Embankment, there is a peculiarity. Parliament-street is almost as full of pipes as it can possibly be, and it may be that a company desiring to lay its pipes in the same direction as the Thames Embankment, or parallel with it, will feel itself almost compelled to go down the Thames Embankment. I believe at Charing Cross there are not fewer than 33 pipes, and up Parliament-street there must be 20 pipes.

5102. Mr. *Powell.*] Do you know how many pipes there are in Victoria New-street?—No, I do not; not the same number as Parliament-street.

5103. Have you any idea what number there is?—No; but I can soon learn, and communicate it to you.

5104. Viscount *Grey de Wilton.*] You were saying, that out of the possible 25 per cent. in loss of gas, you only ascribe about 5 per cent. to leakage?—To leakage from mains in the street. The large per-centage which is spoken of is the aggregate of a great number of per-centages. It includes these: all the loss in the company's work after the gas has passed the meter, that is to say, in all the pipes, the gasholders, and other apparatus, the gasholders being always more or less leaky within the company's works. As a rule, it includes all the gas which is burnt upon the gas works, because they do not measure it: that generally amounts to 3 per cent. itself. Then, besides that, it includes all the over-consumption by the public lights, a consumption which is always more than is contracted for. Besides that, it includes all the defective registration of the meters; meters are not removed until they become positively bad. But supposing the case of the best water meter; the water meter measures the gas by an instrument called a drum or wheel, which revolves on the surface of the water; in course of time that drum or wheel becomes perforated by little holes by decay, and all the gas that comes through those holes goes to the lights within the house without any registration at all, so that there is always a loss by the meters. The same in the dry meter, that which goes through the valves and various other ways is not measured. Then the loss by service pipes leading into the houses is also unmeasured. Then there is the condensation. We pump out of the holes in the streets a considerable quantity of oily matter, that is, liquified gas; that is a sensible portion of the loss again. Then all the abstraction by the wrong of ill-minded people, who join the main pipes behind the meter or otherwise, and get gas that they do not pay for. I am quite clear when I say that the quantity of gas which exudes from the main pipes would be less than 5 per cent. I state what is as near the fact as can be obtained.

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Mr. *Phinn* stated that the pipes were now laid in the Southwark Subway in the manner suggested by Mr. Innes, and, if the Committee desired, they could go and see them.

Mr. *Denison* objected to the Committee visiting the subway, as there would be no means of properly examining into the condition of the subway by the examination of witnesses.

[*The following Papers were delivered in by Mr. Muir.*]

DIMENSIONS of the screw cocks, or valves, which the New River Company have upon their 36-inch mains.

	feet.	*inches.*
Width	4	4
Height, exclusive of stuffing-box and projecting part of the spindle	8	–
Height, including stuffing-box and spindle	8	10½

James Muir.

ESTIMATES to ascertain what would, in the average of years, be the probable effect of subways upon the New River Company's annual expenditure.

Probable Annual Saving per Mile of Subway:

	£.	*s.*	*d.*
1. Cost, now incurred, in repairing trenches opened for the repair and alteration of the company's pipes, &c., about	5	6	8
2. Cost, now incurred, in excavating for these repairs and alterations, about	4	10	–
3. Material and labour (beyond the excavation allowed for above) which might be saved by a reduction of leakages, if pipes are so placed in subways as to be less affected, than now, by the vibration of street traffic. Suppose one broken pipe less, in 10 years, at 60*s.*, and three joint settings less, in one year, at 1*s.*	–	9	–
4. Material and labour (beyond the excavation allowed for, above) which might be saved, if cocks require less packing. Suppose three cock packings less, in one year, at 1*s.*	–	3	–
	£. 10	8	8

Probable Additional Annual Expenditure per Mile of Subway:

	£.	*s.*	*d.*
1. Inspection of pipes in subway, 1*s.* per day	18	5	–
2. Artificial light for inspection, and for the work to be done on pipes in subways, 2*d.* per day	3	–	–
3. Maintenance of 25 hydrants, at 1*s.*	1	5	–
4. Extra labour in getting materials to place, and in removing "slop," &c., on the occasion of pipe repairs and alterations in subways. Suppose two such occasions in one year, requiring only 3*s.* 6*d.* each, on average, for the extra labour referred to	–	7	–
	£. 22	17	–

No account is here taken of extraordinary repairs or alterations, or of the losses which the company might suffer through gas explosion, or of the extra damage likely to attend a heavy water leakage in a subway.

The

The foregoing estimates are made, as the only means of now judging of the effect of subways on the company's annual expenditure. Some of the smaller items which they contain are, necessarily, conjectural: but they have not amount enough to affect the general conclusion, that all the annual savings which subways promise to the companies, are likely to be more than absorbed by the ordinary additional annual expenses to which the companies would, by these subways, be put. *T. Hawksley*, Esq. 31 May 1864.

James Muir.

LENGTHS of the larger mains which the New River Compaay have laid in the public ways of the Metropolis.

9,291 yards of 18-inch.
2,519 yards of 22-inch.
815 yards of 24-inch.
750 yards of 33-inch.
10,705 yards of 36-inch.

James Muir.

STATEMENT of the cost of providing and laying a line of 6-inch pipes, with connections from a Main in St. Martin's-lane into and along the Subway of New King-street, Covent Garden.

	£	s.	d.
127 yards of 6-inch pipe	27	18	4
4 bends (for main, hydrant, and emptying cock)	3	11	5
Collars	–	13	1
Screw cock	4	10	–
Hydrant	1	–	–
Branch pipe for hydrant	–	7	3
Cock, hydrant, and plug-boxes	–	15	–
Emptying cock	3	18	–
Wooden plugs	–	1	7
Iron pins and wood blocks for hydrant, and fire-plug boxes	–	14	9
Bolts, lead, and yarn, for fixing hydrant	–	7	6
Lead, yarn, fire, &c., for joints	4	18	9
Foreman, 6 days at 6*s.* Men, 12½ days at 5*s.*, 21 days at 4*s.*, and 5 days at 2*s.* 9*d.*	9	16	3
Bricklayer making good openings required in brickwork of subway	–	10	6
Use and repair of tools	–	10	–
Candles and lanthorns	–	11	2
Fences for trench at end of subway	–	9	–
Repairing trench at end of subway	2	–	–
Cartage of pipes, tools, surplus, ground, &c.	2	7	3
Tolls	–	1	3
£.	65	1	1

James Muir.

ESTIMATE of the cost of providing and laying, in the usual way, a line of 6-inch pipes, having together the length of those pipes which have been laid from the New River Company's main in St. Martin's-lane, into and along the Subway of New King-street, Covent Garden.

	s.	d.	
Pipes at the price of those laid in the subway	4	4½	per yard run.
Excavation Laying and jointing Filling Ramming Temporary reinstatement of paving Carting, &c.	1	7½	per yard run.
Repairing trench in a permanent manner	2	–	
Whole price	8	–	per yard run.

	£	s.	d.
128 yards, at 8*s.*	51	4	–
Screw cock as in subway	4	10	–
Cock and plug boxes, and plugs	–	13	9
£.	56	7	9

James Muir.

T. Hawkesley, Esq.

31 May 1864.

STATEMENT of the circumstances which would make the laying of pipes in subways a more expensive work than the laying of similar pipes in the ground in the usual way; with estimates of the additional cost to which these circumstances would each probably give rise in the case of a 7-inch main placed in a subway :—

	s.	*d.*	
Making connections with side branches, without taking into account the special bends which may be needed, to avoid other pipes in the subway - - - - - - -	2	6	per yard run.
More expensive apparatus for fire supply - - - -	–	9	„
Additional emptying cocks, and air escape valves - - -	–	6	„
Supports for pipes, cocks, hydrants and branches - - -	3	4	„
Artificial light - - - - - - - - - - -	–	1	„
Additional length which cock spindles must have - - -	–	1	„
Extra labour in getting pipes, cocks, collars, tools, &c., to their places in the subway - - - - - - -	–	1	„
Hindrance from insufficiency of light and space - - -	–	$-\frac{1}{2}$	„
Additional pay for underground work, with its risks - -	–	$-\frac{1}{2}$	„
	7	5	per yard run.
Deduct the cost of excavation and paving, which now attends the laying a 7-inch main in the usual way - - - -	2	5	
Net additional expense of laying a 7-inch main in a subway -	5	0	per yard run.
Were supports dispensed with (as in the Covent Garden Subway) and pipes merely bedded in the gravel of the subway bottom, 3 *s.* might be taken from the above net amount, so as to reduce it to - - - - - - - - -	2	–	per yard run.

A 7-inch main may now be provided, laid, and paved over in the usual way, for 9 *s.* 6 *d.* per yard run. To this price, the first of the foregoing net amounts would add about $52\frac{1}{2}$ per cent. The second net amount would add to it about 21 per cent.

With larger pipes, the increased cost would be proportionately higher.

James Muir.

Mr. *Denison* was heard to address the Committee on behalf of the Water Companies.

[Adjourned to To-morrow at Twelve o'clock.

Mercurii, 1° *die Junii*, 1864.

MEMBERS PRESENT:

Mr. Du Pré.	Sir Baldwin Leighton.
Viscount Grey de Wilton.	Mr. F. S. Powell.
Mr. Floyer.	

SIR BALDWIN LEIGHTON, BART., IN THE CHAIR.

1 June 1864.

Mr. *Richards* desired to correct an answer given by Mr. Stephens, which was as follows: "I think the average may safely be taken at about 12 feet." It ought to have been, "I think the average may safely be taken at about four feet."

Mr. *Phinn* was heard to sum up the whole case on behalf of the Promoters of the Bill.

The Committee-room was cleared.

After some time, the Counsel and parties were again called in.

The *Chairman* stated, that the Committee had not at present decided upon the Preamble of the Bill, but that they had agreed to the following Resolution; "Resolved, that so much of the Bill as relates to the compulsory placing of Gas pipes in the subways be omitted," and that if there were any verbal or technical objections, to be taken by either side, they could be stated when the Committee met again. The proposal of the Committee was, that the Preamble should read thus: "Whereas subways have been constructed, or are proposed to be constructed in a new street near Covent Garden, under Southwark-street, under the proposed Thames Embankment (North Side), and under the proposed new street, between Blackfriars and the Mansion House, by the Metropolitan Board of Works, hereinafter called the Board; and whereas, in order to prevent inconvenience to the public by the frequent breaking up of the said streets, it is expedient to enable the Board to require companies or persons intending or required to place water and other pipes, except gas pipes, in the said streets, and to lay the same in the subways upon proper terms and conditions. He also stated, that the Committee desired to propose, with reference to Clause C., that it should read thus: "In determining, in any case, the amount and form of such payment, the arbitrators or umpire acting in the arbitration, shall have regard to the pecuniary benefit accruing to the company, body, or person using the subway, by reason of saving, in respect of leakage, and in respect of the expense of, and connected with the laying, fitting, inspection, and repair of pipes, and the opening and re-laying of roads, and paving and repairing, and otherwise, by reason of the use of the subway."

[Adjourned till Friday next, at Two o'clock.

Veneris, 3° die Junii, 1864.

MEMBERS PRESENT:

Mr. Du Pré.	Sir Baldwin Leighton.
Mr. Floyer.	Mr. Powell.
Viscount Grey de Wilton.	

SIR BALDWIN LEIGHTON, BART., IN THE CHAIR.

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3 June 1864.

Mr. *Johnson* stated that after the decision of the Committee, excluding gas pipes from the Bill, the Metropolitan Board had decided not to proceed further with the Bill.

APPENDIX.

LIST OF APPENDIX.

Appendix, No. 1.

Papers handed in by Mr. F. W. Goddard, 6 May 1864: PAGE.

Traffic Returns:

Account taken by James Greenway, 30, Lambeth-square, of the Number of Vehicles passing down Ludgate-hill on the following Days, viz., Wednesday, April 18th; Thursday, April 19th; Friday, April 20th; and Saturday, April 21st, 1863, between the hours of 9 A.M. and 6 P.M. - - - - - - - - - - - - 291

Statement of Carriage Traffic by Mr. E. R. Cowdry; corner of Bridge-street and Ludgate-hill - - - - - - - - - - - - - - - - 292

Statement of Carriage Traffic by L. Bohling, entering City at Poultry.—In Traffic - 293

Statement of Traffic by Joseph Steveens; Blackfriars Bridge, going out of the City - 294

Statement by Thomas Wakerly, of 8, Little Andrew's-street, St. Martin's-lane, of Carriage Traffic. Entry from Blackfriars Bridge to City - - - - - - 295

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Return of Omnibus Traffic furnished by Mr. Church, Secretary to the London General Omnibus Company - - - - - - - - - - - - - - 296

Appendix, No. 2.

Paper handed in by Mr. J. W. Bazalgette, 6 May 1864:

Metropolitan Board of Works.—Report of the Committee appointed by the Board to consider the Designs for Subways in New Streets in the Metropolis, and to award Prizes in respect thereof - - - - - - - - - - - - - 297

APPENDIX.

Appendix, No. 1

PAPERS handed in by Mr. *F. W. Goddard*, 6 May 1864.

TRAFFIC RETURNS.

Appendix, No. 1.

ACCOUNT taken by *James Greenway*, 30, Lambeth Square, of the Number of VEHICLES passing down LUDGATE HILL on the following Days, viz., Wednesday, April 18th; Thursday, April 19th; Friday, April 20th, and Saturday, April 21st, 1863, between the Hours of 9 A.M. and 6 P.M.

	Carts.	Omnibuses.	Cabs.	Private Carriages.	TOTAL.
Wednesday's Account:					
9 o'clock till 10 o'clock	140	66	92	13	311
10 „ 11 „	168	90	235	32	525
11 „ 12 „	147	71	190	33	441
12 „ 1 „	152	79	208	49	488
1 „ 2 „	102	60	177	32	371
2 „ 3 „	155	84	247	35	521
3 „ 4 „	110	52	161	25	348
4 „ 5 „	180	100	233	44	557
5 „ 6 „	138	76	137	36	387
	1,292	678	168	299	3,949
Thursday's Account:					
9 o'clock till 10 o'clock	177	60	98	26	361
10 „ 11 „	166	78	198	24	466
11 „ 12 „	153	77	172	30	432
12 „ 1 „	176	81	224	45	526
1 „ 2 „	145	77	194	51	467
2 „ 3 „	150	73	199	41	463
3 „ 4 „	142	78	238	38	496
4 „ 5 „	127	79	193	28	427
5 „ 6 „	105	81	197	41	484
	1,401	684	1,713	324	4,122
Friday's Account:					
9 o'clock till 10 o'clock	180	75	100	30	385
10 „ 11 „	99	84	187	46	416
11 „ 12 „	153	78	191	35	457
12 „ 1 „	171	86	206	47	510
1 „ 2 „	137	67	223	51	478
2 „ 3 „	155	78	213	40	486
3 „ 4 „	169	83	220	39	511
4 „ 5 „	156	77	198	35	466
5 „ 6 „	141	78	162	32	413
	1,361	706	1,700	355	4,122
Saturday's Account:					
9 o'clock till 10 o'clock	172	71	103	27	373
10 „ 11 „	203	89	231	40	563
11 „ 12 „	174	78	200	40	492
12 „ 1 „	216	87	227	53	583
1 „ 2 „	201	85	226	69	581
2 „ 3 „	223	92	300	63	678
3 „ 4 „	141	93	225	37	496
4 „ 5 „	132	89	198	46	465
5 „ 6 „	117	82	164	31	395
TOTALS	1,579	767	1,874	406	4,626

Total on Wednesday	3,949
„ Thursday	4,122
„ Friday	4,122
„ Saturday	4,626
TOTAL	16,819

Appendix No. 1.

STATEMENT of CARRIAGE TRAFFIC by Mr. *E. R. Cowdry*; corner of BRIDGE STREET and LUDGATE HILL.

	Carts.	Omnibuses.	Cabs.	Private Vehicles.	TOTAL.
1863:					
Wednesday, 15 April:					
9 o'clock till 10 o'clock	253	63	99	73	
10 „ „ 11 „	178	80	243	35	
11 „ „ 12 „	149	78	257	33	
12 „ „ 1 „	153	81	234	37	
1 „ „ 2 „	124	69	206	31	
2 „ „ 3 „	118	68	201	34	
3 „ „ 4 „	169	79	213	42	
4 „ „ 5 „	167	78	164	44	
5 „ „ 6 „	148	75	176	39	
	1,459	671	1,793	368	4,291
Thursday, 16 April:					
9 o clock till 10 o'clock	270	57	87	22	
10 „ „ 11 „	211	65	197	22	
11 „ „ 12 „	140	60	168	39	
12 „ „ 1 „	181	86	241	42	
1 „ „ 2 „	146	70	101	39	
2 „ „ 3 „	114	53	138	21	
3 „ „ 4 „	168	75	179	49	
4 „ „ 5 „	163	78	191	32	
5 „ „ 6 „	160	84	164	22	
	1,553	618	1,467	288	3,926
Friday, 17 April:					
9 o'clock till 10 o'clock	296	59	87	22	
10 „ „ 11 „	183	75	120	18	
11 „ „ 12 „	156	82	210	38	
12 „ „ 1 „	163	74	194	29	
1 „ „ 2 „	142	73	82	25	
2 „ „ 3 „	136	70	217	34	
3 „ „ 4 „	169	61	160	36	
4 „ „ 5 „	203	81	182	50	
5 „ „ 6 „	184	77	162	26	
	1,632	652	1,414	278	3,976
Saturday, 18 April:					
9 o'clock till 10 o'clock	322	56	82	12	
10 „ „ 11 „	222	75	208	18	
11 „ „ 12 „	177	82	230	21	
12 „ „ 1 „	190	77	219	33	
1 „ „ 2 „	177	71	195	25	
2 „ „ 3 „	159	77	218	38	
3 „ „ 4 „	141	66	199	32	
4 „ „ 5 „	144	81	171	23	
5 „ „ 6 „	84	80	53	17	
	1,616	665	1,575	219	4,075
					16,268

STATEMENT of CARRIAGE TRAFFIC by *L. Bohling*, entering CITY at POULTRY.— In Traffic. Appendix, No. 1.

	Carts.	Omnibuses.	Cabs.	Private Carriages.	TOTAL.
15 April:					
9 o'clock till 10 o'clock	159	174	92	17	
10 „ 11 „ -	148	176	243	132	
11 „ 12 „ -	140	161	262	26	
12 „ 1 „ -	120	146	208	35	
1 „ 2 „ -	136	140	225	38	
2 „ 3 „ -	121	146	192	31	
3 „ 4 „ -	105	158	237	34	
4 „ 5 „ -	116	168	176	22	
5 „ 6 „ -	133	160	188	30	
	1,178	1,429	1,823	365	4,795
16 April:					
9 o'clock till 10 o'clock	151	170	111	18	
10 „ 11 „ -	127	174	253	30	
11 „ 12 „ -	148	179	306	37	
12 „ 1 „ -	96	121	152	31	
1 „ 2 „ -	107	143	257	30	
2 „ 3 „ -	135	152	211	26	
3 „ 4 „ -	137	148	250	34	
4 „ 5 „ -	113	171	168	27	
5 „ 6 „ -	137	159	167	9	
	1,151	1,417	1,875	242	4,685
17 April:					
9 o'clock till 10 o'clock	149	173	103	19	
10 „ 11 „ -	183	167	260	30	
11 „ 12 „ -	173	155	240	47	
12 „ 1 „ -	108	159	245	27	
1 „ 2 „ -	133	139	230	32	
2 „ 3 „ -	123	147	249	26	
3 „ 4 „ -	126	160	237	34	
4 „ 5 „ -	138	162	192	24	
5 „ 6 „ -	153	162	176	12	
	1,286	1,424	1,932	251	4,893
18 April:					
9 o'clock till 10 o'clock	169	166	196	16	
10 „ 11 „ -	177	170	233	37	
11 „ 12 „ -	171	150	255	31	
12 „ 1 „ -	144	160	222	43	
1 „ 2 „ -	164	137	232	32	
2 „ 3 „ -	130	161	199	30	
3 „ 4 „ -	115	156	182	24	
4 „ 5 „ -	85	176	165	15	
5 „ 6 „ -	70	166	104	10	
	1,230	1,442	1,848	238	4,758
	4,845	5,712	7,578	1,096	19,231

Appendix, No. 1.

STATEMENT of TRAFFIC by *Joseph Stevens*; BLACKFRIARS BRIDGE, going out of the CITY.

	Carts.	Omnibuses.	Cabs.	Private Carriages.	TOTAL.
15 April:					
9 A.M. till 10	220	22	50	18	
10 „ 11	102	21	114	21	
11 „ 12	204	24	76	22	
12 „ 1	212	22	70	30	
1 „ 2	149	21	84	20	
2 „ 3	169	22	66	25	
3 „ 4	190	25	90	32	
4 „ 5	182	22	134	58	
5 „ 6	180	20	85	21	
	1,608	199	769	247	
16 April:					
9 A.M. till 10	220	22	52	24	
10 „ 11	205	20	102	37	
11 „ 12	245	24	106	28	
12 „ 1	214	22	95	25	
1 „ 2	160	20	65	26	
2 „ 3	156	20	74	25	
3 „ 4	214	22	104	24	
4 „ 5	104	22	118	43	
5 „ 6	192	22	125	25	
	1,710	194	841	257	
17 April:					
9 A.M. till 10	252	26	60	26	
10 „ 11	259	23	120	40	
11 „ 12	280	24	121	47	
12 „ 1	220	26	61	24	
1 „ 2	202	20	58	30	
2 „ 3	187	21	74	24	
3 „ 4	243	24	93	25	
4 „ 5	258	24	142	28	
5 „ 6	265	22	115	30	
	2,166	210	844	274	
18 April:					
9 A.M. till 10	240	24	50	36	
10 „ 11	205	20	105	25	
11 „ 12	230	25	95	26	
12 „ 1	245	22	105	24	
1 „ 2	210	20	106	30	
2 „ 3	208	21	125	45	
3 „ 4	160	23	121	26	
4 „ 5	165	22	120	34	
5 „ 6	160	23	90	15	
	1,823	200	917	261	
	7,307	803	3,371	1,039	12,520

STATEMENT by *Thomas Wakerly*, of 8, Little Andrew's-street, St. Martin's-lane, of CARRIAGE TRAFFIC. Entry from BLACKFRIARS BRIDGE to CITY. Appendix, No. 1.

	Carts.	Omnibuses.	Cabs.	Private Carriages.	TOTAL.
April 15:					
9 o'clock till 10 o'clock	190	23	59	19	
10 „ 11 „	124	26	114	43	
11 „ 12 „	174	21	96	43	
12 „ 1 „	226	25	56	34	
1 „ 2 „	274	20	57	26	
2 „ 3 „	164	20	58	44	
3 „ 4 „	201	22	66	39	
4 „ 5 „	187	22	101	32	
5 „ 6 „	169	26	87	30	
	1,689	205	704	310	
April 16:					
9 o'clock till 10 o'clock	173	24	57	32	
10 „ 11 „	201	26	96	32	
11 „ 12 „	221	23	111	33	
12 „ 1 „	205	24	85	26	
1 „ 2 „	187	16	57	26	
2 „ 3 „	217	22	91	34	
3 „ 4 „	236	21	83	39	
4 „ 5 „	208	23	108	56	
5 „ 6 „	202	23	89	25	
	1,850	202	672	303	
April 17:					
9 o'clock till 10 o'clock	214	24	64	22	
10 „ 11 „	253	25	86	35	
11 „ 12 „	255	23	126	41	
12 „ 1 „	245	25	64	26	
1 „ 2 „	244	17	71	34	
2 „ 3 „	184	20	82	25	
3 „ 4 „	205	19	58	34	
4 „ 5 „	194	22	108	35	
5 „ 6 „	179	26	87	38	
	1,973	203	746	285	
April 18:					
9 o'clock till 10 o'clock	197	25	62	23	
10 „ 11 „	224	26	108	36	
11 „ 12 „	201	22	83	46	
12 „ 1 „	195	22	71	31	
1 „ 2 „	177	18	81	41	
2 „ 3 „	178	19	50	39	
3 „ 4 „	160	23	116	29	
4 „ 5 „	176	21	76	31	
5 „ 6 „	132	27	85	20	
	1,640	203	737	296	
	7,152	803	2,859	1,194	12,008

Appendix, No. 1.

STATEMENT of Traffic made by Mr. *H. B. Warnett.*

	Carts.		Omnibuses.		Cabs.		Private Carriages.	
1863:								
15 April:								
9 o'clock till 10 o'clock	113		139		94		24	
10 „ 11 „	100		158		201		22	
11 „ 12 „	102		89		155		5	
12 „ 1 „	63		144		187		31	
1 „ 2 „	84		118		200		30	
2 „ 3 „	76		133		195		31	
3 „ 4 „	87		132		210		24	
4 „ 5 „	130		164		212		28	
5 „ 6 „	102		140		183		17	
		857		1,227		1,687		212
16 April:								
9 o'clock till 10 o'clock	117		149		101		17	
10 „ 11 „	110		155		122		28	
11 „ 12 „	104		145		222		33	
12 „ 1 „	96		147		202		28	
1 „ 2 „	75		127		198		26	
2 „ 3 „	99		127		218		33	
3 „ 4 „	111		145		213		35	
4 „ 5 „	112		148		214		33	
5 „ 6 „	93		151		171		20	
		917		1,294		1,661		255
17 April:								
9 o'clock till 10 o'clock	148		132		93		28	
10 „ 11 „	84		152		208		30	
11 „ 12 „	103		134		192		24	
12 „ 1 „	46		130		190		17	
1 „ 2 „	78		118		190		34	
2 „ 3 „	104		134		221		30	
3 „ 4 „	106		122		194		49	
4 „ 5 „	78		155		207		26	
5 „ 6 „	129		140		103		20	
		946		1,217		1,595		253
18 April:								
9 o'clock till 10 o'clock	139		140		87		12	
10 „ 11 „	151		159		193		6	
11 „ 12 „	109		133		204		21	
12 „ 1 „	142		141		193		31	
1 „ 2 „	102		141		224		21	
2 „ 3 „	101		128		243		33	
3 „ 4 „	104		137		211		25	
4 „ 5 „	84		158		201		19	
5 „ 6 „	79		150		176		5	
		1,011		1,287		1,732		197

RETURN of Omnibus Traffic furnished by Mr. *Church*, Secretary to the London General Omnibus Company.

	Omnibuses.	Times Passing.
Temple Bar, Ludgate Hill, to St Paul's	204	1,744
Cheapside and Poultry to Bank	439	4,220
Cornhill	110	1,050
King William-street and London Bridge	238	2,306
Holborn, Snow Hill, and Moorgate-street	249	2,516

Appendix, No. 2.

PAPER handed in by Mr. *J. W. Bazalgette*, 6 May 1864.

METROPOLITAN BOARD OF WORKS.

REPORT by the COMMITTEE appointed by the Board to consider the DESIGNS for SUBWAYS in NEW STREETS in the METROPOLIS, and to award PRIZES in respect thereof. Appendix No. 2.

Metropolitan Board of Works,
1, Greek-street, Soho, 16 September 1857.

THE Board having agreed to the following Resolution—

"That prizes be offered for public competition for designs showing the best mode of laying out the surface and subsoil of the new street in Southwark, as an example of a first-class street, and also of the street in Westminster as a second-class street, showing the disposition of the private vaults, sewers, gas, and water-pipes, telegraph wires, with any parts of the soil appropriated to other useful purposes.

"Prizes—First-class street	100 guineas.
" "	50 "
" "	10 "
"Second-class street	50 guineas.
" "	20 "
" "	5 "

"That the details of this competition be carried out by the Works Committee"—

Your Committee were appointed by the following Resolutions:—

"That the designs which may be sent in to the Board by the several competitors, showing the best mode of laying out the surface and subsoil of the new streets, and other particulars described in the resolution of the Board of the 16th January, be referred to a committee of seven persons, consisting of four professional men, and the chairman, and two other members of this Board, assisted by the engineer and superintending architect.

"That Mr. Alderman Cubitt and Mr. Wright be the members to be associated with the chairman."

The professional members of your committee were requested and consented to assist in the examination of the designs.

In reply to the Advertisement 39 Competitors sent in Designs, of which the following is a List:—

Serial Number.	Drawings of Designs for First Class.	Drawings of Designs for Second Class.	MOTTO.
1	3	3	Pro bono publico.
2	General	-	The winner.
3	2	Applicable to second class.	Gracious be the issue.
4	2	ditto	Sub terra.
5	2	1	Perseverance.
6	1	1	Præmeditatus.
7	2	Applicable to second class.	Practical.
8	3	2	Curà.
9	3	-	Desiderium seculi.
10	1	1	Cloacina.
11	3	1	Ferimur per opaca locorum.
12	2	-	A. D. 2000.
13	4	6	Access, cleanliness, and permanence.
14	4	-	Est modus in rebus.
15	5	-	Nemo.
16	1	-	Victoria.
17	2	1	Once made always perfect.

(*continued*)

Appendix, No. 2.

Serial Number.	Drawings of Designs for First Class.	Drawings of Designs for Second Class.	MOTTO.
18	5	Applicable to second class.	Hope.
19	1	ditto	(Juvenis) Unus inter multos.
20	3	3	Labor omnia vincit.
21	3	3	Anonymous.
22	6	2	Sperans.
23	1	-	Delhi.
24	2	1	Aux grands maux les grands remèdes.
25	6	-	Peto.
26	5	Applicable to second class.	Selim's duplicate system.
27	-	1	Hector.
28	4	3	Cloaca, Magna and Minor.
29	3	-	Opinions differ.
30	-	1	Perseverance (in a circle).
31	-	1	Unit.
32	4	2	Strada Nuova.
33	3	Applicable to second class.	Alma Mater.
34	3	2	Hope.
35	1	-	Pedestres.
36	2	1	Cleanliness, comfort, economy.
37	1	1	Utilitate.
38	4	2	Per Bontà del' Uomo e Bestia.
39	4	2	Gully.

Your committee report, that they have been assisted by J. W. Bazalgette, Esq., Engineer, and Frederick Marrable, Esq., Superintending Architect to your Board, and have unanimously awarded the several prizes as follows:—

First Class Street.

Serial No.	Motto.	Name and Address.	Prize.
			Guineas.
19	(Juvenis) Unus inter multos	H. D. Davis, 227, Maida-hill West	100
32	Strada Nuova	James Thomas Knowles, 1, Raymond-buildings, Gray's Inn.	50
11	Ferimur per opaca locorum	Frederick and Alfred Warren, 2, Duke-street, Adelphi.	10
	Second Class Street.		
3	Gracious be the issue	W. H. Cullingford, 43, Pembridge Villas, Bayswater.	50
26	Selim's Duplicate System	William Reddall, 3, Chapel-place, Poultry.	20
24	Aux grands maux les grands remèdes.	Samuel Hughes and George Hopkins, 14, Park-street, Westminster	5

The difficulties in the way of arriving at a satisfactory decision have been very great; no general principles were found to apply, nor was it possible either to approve or condemn all the parts of any of the designs submitted to competition.

Your committee have therefore selected those designs which appeared to them to be most susceptible of such practical adaptations as would render them most generally applicable to the circumstances of the metropolis.

(signed) *Robt. Stevenson.* *William Cubitt.*
T. Hawksley. *Alex. Wright.*
Geo. Lowe. *J. W. Bazalgette.*
Thos. Henry Wyatt. *Fredk. Marrable.*
J. Thwaites.

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TO THE

REPORT

FROM THE

SELECT COMMITTEE

ON THE

METROPOLITAN SUBWAYS BILL.

Ordered, by The House of Commons, *to be Printed*,
13 *June* 1864.

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Grounds for concluding that the laying of gas and water pipes in the same subway will not have the slightest injurious effect upon the water pipes, 762–776. 791——Improvement if the pipes in the Covent Garden subway had not been laid under the surface or covered with gravel, 769–772——Much greater liability of gas pipes to fractures when laid in the streets than when in subways, 775–784——Facility of inspection in subways, 785——Advantage of painting or coating the joints of gas pipes in subways with white lead, 786, 787.

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Further reference to the subways in Paris and the use made of them: belief as to there being gas and water pipes in the same subway, without any injury to the latter, 850–859. 922–935——Instances of gas explosions in open trenches adverted to with reference to the question of liability to explosion in subways, 860–871——In the subways now made there is a separate supply or service pipe for each house, with a side gallery to every two houses, 872–879——Sense in which the cost of the subways to the companies may be said really to fall upon the ratepayers, that is, in the price paid by them for gas or water, 888–893. 936–938——Assumption of 4 per cent. per annum as a proper representation of the outlay to be apportioned, 891. 943–948.

Greater liability of water pipes being polluted from proximity to gas pipes under the streets than in subways, 894–898——Independent ventilation of the sewers under the subways, 899–901——Interval desirable between the several pipes with a view to their being readily accessible for inspection or repairs, 902–906. 910, 911——Special arrangements to be made in any subway in which it is anticipated that several pipes may be laid, 903–906. 939–942——Approval of the pipes being laid upon chairs or pedestals, not too far apart, 907–909——Facility for attaching gas meters to the service pipes in the subway, as a check upon fraud, without any inconvenience arising in their inspection, 912–921.

Cellars. Difficulty in preventing an escape of gas in the subway from finding its way into cellars of houses through the lateral passages, *Hawkesley* 4898.

Chairs or Supports (*Pipes in Subways*). Solid bearing of the pipes if placed, as proposed, upon chairs nine feet apart, *Bazalgette* 350–357——Improvement by placing the pipes on chairs, as compared with the arrangement at Covent Garden, where they are laid a few inches in the gravel, *Marrable* 476–481. 541–544——Approval of the pipes being laid upon chairs or pedestals, not too far apart, *Carpmael* 907–909——The pipes might be laid upon blocks of brick or upon cast-iron supports, *Hemans* 1084——Statement as to the cost and mode of construction of the brick piers required for supporting the mains in subways, *Innes* 2339–2351——Considerable expense of supports for pipes in subways, *Muir* 3509, 3510.

Chancery-lane. Circumstance of Chancery-lane having been opened from end to end by the New River Company twelve months after it had been repaved in 1862, *Isaacs* 975. 978, 979.

Chartered Gas Company. Number of openings by the company in the streets of St. Martin's-in-the-Fields in each of the years 1856–63, *Ev. p.* 4——Statement of the number of openings made by the company in the streets or pavements in St. Marylebone parish in each of the years 1859–63, *ib.*——Return of openings made by the company in the streets in the Holborn district during the several years 1859–63, *ib.* 5.

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Number of openings by the Company in the streets of St. Martin's-in-the-Fields in each of the years 1856–63, *Ev. p.* 4.

District supplied by the Chelsea Water Company; it comprises about 200 miles of pipeage, *Simpson* 2554, 2555——In the Chelsea district there are about seventy miles of street in which only one pipe is laid, and forty-six miles in which there are two or more pipes, *ib.* 2565–2568——In some streets there are as many as four pipes, *ib.* 2568.

Chipping (*Connection of Pipes.*) Objection to the practice of chipping in connecting service pipes with the mains, under the present system, *Bramwell* 1839–1842——Avoidance in a subway of the danger arising from the practice of chipping, such as it is, *Innes* 2217–2224.

City of London Gas Company. Return of openings made by the Company in the streets of the Holborn district during the several years 1859–63, *Ev. p.* 5. *See* also *Mansion Housestreet.*

Commercial Gas Company. The Commercial Gas Company do not petition against the Bill, *Jones* 1621——District supplied by the Company; there are no subways made or contemplated there at present, *ib.* 1622. 1656–1660——Witness advised the Company not to oppose the Bill, and assigns several reasons in favour of subways for the laying of gas pipes, *ib.* 1624–1655.

With regard to explosions at the Commercial Gas Works, they have not arisen in the open air, *Jones*, 1651–1654. 1692–1697. 1721, 1722——Absence of any accidents or explosions at the exposed pipes about the Commercial Gas Works, excepting those arising from gross carelessness, *ib.* 1651–1654——Amount of the annual supply and rental of the Commercial Company; loss of some 7,000 *l.* or 8,000 *l.* a year from leakage in various ways, *ib.* 1739–1744. 1748–1752. 1756.

COMPULSORY POWERS:

1. *Evidence in favour of the Gas and Water Companies being compelled to use the Subways.*
2. *Evidence to a contrary purport.*
3. *Proposition by the Promoters relative to the Application and Limitation of the Compulsory Clauses.*
4. *Conclusion of the Committee adverse to the compulsory placing of Gas-pipes in Subways.*

1. *Evidence in favour of the Gas and Water Companies being compelled to use the Subways:*

Expediency of the Gas and Water Companies being required by Parliament to use the subways; otherwise the expenditure is money thrown away, *Bazalgette*, 159–162——Comparative uselessness of the subways unless the Companies be required to use them, *ib.* 407——It is only reasonable that the Board should have the power of compelling the Companies to use the subways in new streets, *Tite* 639–643——Expediency of the Companies being compelled to use the subways, *Carpmael* 835–849.

Absurdity of constructing subways unless the Companies use them, *Isaacs* 988——Opinion as to the fairness of compelling the Companies to use the subways and to pay towards them, notwithstanding that the cost of using them is still only conjectural, *ib.* 1010–1017.

Impropriety of forming subways at all, and of paving new streets in an expensive manner, if the Companies are not required to use the former, and may still rip up aud injure the pavement just after it is finished, *Hemans*, 1055——Expediency in the case of new streets, with subways, of the pipes being placed, compulsorily, in the right place at first, *ib.* 1193–1199.

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2. *Evidence to a contrary purport:*

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Expediency of the question as to damages and compensation being settled before the companies are forced into the subways; great difficulty on this point, *Muir* 3462, 3463——Unfairness of compelling the companies to go to an increased expense and risk by using the subways, whether they like it or not, *Haywood* 4634. 4639-4642——Concurrence in the opinion as to the unfairness in applying compulsory powers to the companies, and at the same time holding them liable to injuries from explosions, *Hawkesley* 4983.

3. *Proposition by the Promoters relative to the Application and Limitation of the Compulsory Clauses:*

Proposal by the promoters of the Bill to confine the compulsory powers to subways already made, or authorised to be made, *Ev. p.* 173.

4. *Conclusion of the Committee adverse to the compulsory placing of Gas Pipes in Subways:*

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See also *Experiments.* *New Streets.* *Old Streets.* *Rent.*

Connection of Pipes. Efficiency of Mr. Upward's plan for the connection of pipes, *Hemans* 1130–1133——Witness has invented a method for connecting service pipes with the mains without allowing any escape of gas; explains the same to the Committee, and its advantage if used in subways, *Upward* 1759–1777. 1786–1796——Extent to which the invention has already been successfully used, *ib.* 1765, 1766. 1769. 1792–1799——Limited space required round the pipe in using this instrument, *ib.* 1770–1773.

Facility for connecting pipes in subways with those in adjoining streets at a different level, *Brammell* 1832–1838——Absence of difficulty in connecting subway pipes with pipes in streets at right angles, *ib.* 1845, 1846. 1936–1938.

Increased pressure and leakage in bringing the branch pipes into the main in a subway at a low level, *Innes* 2078–2081——Extra expense in a subway in making connections with the side streets, *Muir* 3507——Great difficulty of making the connections of pipes at the intersection of streets by a subway, *Hawkesley* 5047.

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Contraction or Expansion of Pipes. Much less liability of the pipes to contraction or expansion when placed in a subway, *Hemans* 1214–1216. 1276.

Tendency of pipes to contraction at the joints in a subway if well ventilated, *Brothers* 4116–4118——Much less risk of contraction of the pipes in the earth than in a subway, *ib.* 4244, 4245. 4285–4287.

Witness objects strongly to gas pipes in subways on account of the effect of changes of temperature in contracting or expanding the iron and causing leakage, *Barlow* 4770–4778. 4786, 4787——Instance of an explosion at Tunbridge Wells through the contraction of a pipe in consequence of change of temperature, *ib.* 4812–4815——Slight extent to which water pipes are liable to contraction or expansion, *ib.* 4839–4842——Apprehension of serious effects from changes of temperature in subways, *Stephens* 4939, 4940.

COST:

1. *As to the actual Cost of Subways.*
2. *As to the Cost of the Pipes to be used.*
3. *As to the Cost of laying Pipes.*
4. *As to the Cost of Maintenance.*

1. *As to the actual Cost of Subways:*

Average of 3 *l.* per foot run, or 16,000 *l.* per mile, as the cost of the subways made by the Metropolitan Board, *Bazalgette* 97–99——Detailed statement of the cost of the cellars, subway, and side passages at Covent Garden; average of 2 *l.* 15 *s.* per foot as the cost of the subway and side passages, *ib.* 1559.

Explanation as to the returns received by the Metropolitan Board of Works in respect of sales and ground rents in the two new streets; this has nothing to do with the subways, for which a separate return is sought, *Bazalgette* 1594–1601. 1608–1616——With regard to the cost of future subways, the price of bricks and labour is likely to be cheaper rather than dearer than at the present time, *ib.* 1602–1607. 1617, 1618.

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COST—continued,

1. *As to the actual Cost of Subways*—continued.

Witness estimates at 7 *l.* 10 *s.* per foot the cost of a subway in Southwark, sufficiently large for all the pipes likely to be laid there, *Simpson* 2745–2751.

Opinion that the estimate by Mr. Bazalgette and Mr. Simpson, respectively, of the cost of a subway is too low in the former case and too high in the latter, *Bateman* 3147–3155 ——Opinion that proper subways cannot be constructed for less than about 25,000 *l.* per mile, *Haywood* 4486.

2. *As to the Cost of the Pipes to be used:*

Conclusion that gas-pipes in subways need not be of a complicated or costly character; simple construction of the pipes in the subway in Covent Garden and at Nottingham, *Marrable* 456, 457. 533–540——There is no need whatever for a complicated or costly form of pipe, *Hemans* 1079, 1080——Concurrence in the view that there is no need for the pipes being constructed in any complicated or expensive manner, *Tarbotton* 1278.

Necessity of newly designed pipes and special castings on account of the difference of level in subways, *Simpson* 2708–2717.

3. *As to the Cost of laying Pipes:*

Anticipated economy to gas companies by using the subways instead of opening the streets, *Bazalgette* 141–144——Witness considers that the cost of laying gas and water mains in a subway would be much less than the cost of laying them in a new street under the old system, *Marrable* 442–451. 454. 517–532.

Data for the conclusion that the laying of gas and water pipes in subways will, on the whole, be less costly than the present system, *Hemans* 1051–1069. 1134, 1135——The mere laying of the pipes would cost rather less in a subway than in a paved street, and rather more in a subway than in a new street before the paving is down, *ib.* 1053. 1057. 1196. 1256–1265——Estimate of the cost of laying pipes of different dimensions in the roadways, after they have been made and paved, *ib.* 1057–1063. 1134. 1135. 1205–1211. 1258–1260.

Cost of laying pipes under the present system further adverted to; decreased expense if laid in new streets before they are paved, *Hemans* 1205–1211——Further consideration of the cost of laying mains in subways as compared with the cost of laying them in the streets, whether before they are paved or after they are paved, *ib.* 1256–1266.

Calculation showing a very considerable economy by using subways instead of laying down pipes in paved streets, *Tarbotton* 1368–1386. 1402–1407——Experience of witness in the laying of gas mains; calculation as to the cost, *ib.* 1417–1439——Further statement as to the saving by the use of subways, although in the mere act of laying the mains the economy might not be much, 1477–1480. 1483–1486.

The mere cost of the original laying in subways and streets would be about the same, *Bramwell* 1809. 1951——Estimate of the cost of laying pipes of different sizes, under the present system; data upon which founded, *ib.* 1878–1894.

Calculation that the cost of laying a 12-inch pipe in a street is 3 *s.* 6 *d.* a yard, including certain items, or 5 *s.* a yard including also the cost of repairing with granite, *Innes* 2025–2045——Consideration of the probable cost of laying pipes in a subway; heavy item of expense on account of brick piers for the pipes to rest on, *ib.* 2046–2066 ——Difficulty and expense of laying large pipes in subways further adverted to, *ib.* 2230–2239.

Considerable difficulty and expense in substituting one large main for another in a subway, *Hawkins* 2487, 2488.

Addition to former statement as to the data or experience upon which witness supplied an estimate of the cost of laying pipes under the present system, *Bramwell* 2546–2548.

Great trouble in getting large pipes into a subway, and in jointing them there; the expense would be from 18 to 25 per cent. more than in laying them in the ordinary way, *Simpson* 2693–2703.

Increased cost of laying water-pipes in subways as compared with streets, *Bateman* 3121, 3122——Data for the conclusion that the laying and jointing would be at least 50 per cent. more in a subway than in a street, *ib.* 3135–3140.

Further statement that the cost of handling and laying, &c. would probably be from 50 to 100 per cent. more in subways than in open ground; that is, in the case of large pipes, *Bateman* 3289–3323——Large increase of expense where a certain sectional area is provided for by two small pipes instead of by one large pipe, *ib.* 3397–3399. 3408.

Statement of the increased expenses in subways, bringing the total cost of laying, &c. to 22 per cent. more than under the present system, *Muir* 3438–3447. 3507–3512—— Cost of 65 *l.* 1 *s.* 1 *d.* for laying the same length of pipe in Covent Garden subway as would cost 56 *l.* 7 *s.* 9 *d.* in a street, *ib.* 3493, 3494. 3665–3669.

Statement that the cost of laying an 18-inch gas main in the streets is 6 *s.* 8 *d.* per yard, and the cost of laying a 12-inch pipe is 3 *s.* 6 *d.* a yard, exclusive of the re-paving; amount

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3. *As to the Cost of laying Pipes*—continued.

amount of the latter expense, *Hersey* 3840-3853——Average of 2 *s.* 2 *d.* per yard as the cost of laying all the pipes of the Imperial Gas Company in the last fifteen years, the size of the pipes varying from eight inches up to thirty-six inches, *ib.* 3854-3858——The cost of laying small gas mains would be about the same in a subway and in a street, *ib.* 3924. 3927——More trouble and expense in laying large mains in a subway than in a street, *ib.* 3928-3932——Contract of the Imperial Company for the laying of their pipes at so much per yard, according to the size of the pipe, irrespectively of the depth, *ib.* 3980, 3981. 4005-4013.

Estimate that the cost of laying gas pipes is about one-third more in a subway than in the street, *Brothers* 4133-4138.

Increased expense in laying water-pipes in a subway; this applies more to the larger pipes than to the smaller ones, *Greaves* 4344-4346.

Grounds for concluding that the use of the subways would, on the whole, entail increased expense to the companies, *Haywood* 4466-4472. 4539-4541——Calculation that the cost of laying pipes would be from 20 to 25 per cent. more in a subway than in a street, *Barlow* 4788-4794.

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4. *As to the Cost of Maintenance:*

Several ways in which the subways will be a saving to the gas companies and the water companies, *Carpmael* 827-834. 840——Although there may not be much economy through the use of the subways in the mere laying of the pipes, there is a great saving subsequently in the cost of maintenance, *Bramwell* 1951-1953.

Absence of saving in the annual expense by the use of subways, *Muir* 3492——Calculation of the annual saving upon several items, and of the extra expense upon other items, by using subways for water pipes; estimated loss of between 12 *l.* and 13 *l.* per mile per annum, *ib.* 3533-3545.

Increased cost to the companies by the use of subways, even if they did not pay either rent or rates, *Hawkesley* 4964-4971.

See also *Compulsory Powers.* *Covent Garden Subway,* 3. *Explosions.* *Inspection.* *Labour and Workmanship.* *Openings in the Streets.* *Price of Gas.* *Ratepayers.* *Rent.* *Southwark-street Subway,* 4.

Covent Garden Subway:

1. *Particulars as to the mode of Construction, Size, &c.*
2. *Ventilation and Lighting.*
3. *Cost.*
4. *As to the use of the Subway by the New River and Equitable Gas Companies.*
5. *As to the laying of the Pipes underground in the Subway.*

1. *Particulars as to the mode of Construction, Size, &c.:*

Reference to the subway in the new street near Covent Garden as the first constructed, *Bazalgette* 77. 96——Particulars relative to the dimensions and mode of construction of the Covent Garden subway; reference to a model and plans in illustration, *ib.* 100-116——There is a tunnel, or half-circle, six-and-a-half feet high and thirteen feet wide, *ib.* 101——There are means of access in the subway to the gas pipe for each house, *ib.* 102, 103——The subway is 320 feet in length, *ib.* 109.

Examination as to the capacity of the Covent Garden subway with reference to the accommodation of very large mains of the water companies, in addition to the gas pipes, &c.; means of opening and enlarging the subway in accordance with the use to be made of it, *Bazalgette* 323-343. 396.

Witness assisted in preparing the design of the Covent Garden subway, *Marrable* 433-436——Explanation as to the limited size of the side-entrances in the Covent Garden subway, *ib.* 557-559. 590-596.

Insufficiency of the Covent Garden subway if similar pipes were to be laid there as in Cheapside, *Muir* 3483-3485. 3651-3656——Insufficiency of the traps or gratings for carrying off large escapes of water, *ib.* 3716-3720. 3758-3760——Means for checking any

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1. *Particulars as to the mode of Construction, Size, &c.*—continued.

any continued overflow of water in Covent Garden subway if there were a burst there, *Muir* 3767–3770.

2. *Ventilation and Lighting :*

Way in which the ventilation is effected ; absence of inconvenience on this score, *Bazalgette* 128–131——Lighting of the subways by means of the ventilating shafts, *ib.* 132, 133——Very good ventilation in the Covent Garden subway, *Marrable* 482. 605.

Statement that there is very little ventilation in the subway, *Muir* 3771–3775——Insufficiency of the ventilation, *Brothers* 4241–4247——With regard to the frost not affecting the pipes in the subway, there is practically no ventilation in the subway, *Greaves* 4394–4400——Entire insufficiency of the ventilation of the subway, *Barlow* 4844. 4857, 4858.

3. *Cost :*

Examination upon a suggestion made by witness in 1860 that the cost of the Covent Garden subway might be charged upon the houses on each side of the way, *Marrable* 565–589——Arrangement as to the cost of the vaults being placed upon the leaseholders, *ib.* 568–585.

Details showing that the cost of the cellars or vaults along the Covent Garden subway is 1*l.* 9*s.* 3*d.* per foot run of frontage, *Bazalgette* 1558, 1559——Details also showing that the cost of the subway and side passage is 2*l.* 15*s.* per foot run of frontage, *ib.* ——Inaccuracy of a certain statement as to the price of the vaults having been 10*l.* 18*s.* per foot, *ib.* 1563–1565.

Statement as to the cost of laying water pipes being 22 per cent. more in a subway than in a street, as shown by the experience in the case of the Covent Garden subway, *Muir* 3438–3447——The actual increase of cost was only 15 per cent., but a connection with an adjoining pipe would have raised this increase to 22 per cent., *ib.* 3443, 3444 ——Increased cost of laying the pipes in Covent Garden subway adverted to with reference to the extra expense of double bends in connecting with adjoining streets, *ib.* 3600–3615. 3646–3648.

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4. *As to the use of the Subway by the New River and Equitable Gas Companies :*

Statement as to pipes having been laid in the Covent Garden subway by the New River Company and Equitable Gas Company early in 1861, without the slightest difficulty having arisen, *Bazalgette* 117–127.

Successful operation of the subway in regard to the pipes already laid in it, *Marrable* 456–461—— Information relative to the small leakage in the gas pipe in the subway, *ib.* 472–475. 601. 623–626——Carelessness to which this leakage was attributable, *ib.* 472–475. 601.

Circumstance of the two companies who have pipes in the Covent Garden subway being objectors to the present Bill, *Marrable* 610–613——The gas and water pipes lie close together without the slightest inconvenience having been experienced, *ib.* 631–633.

Explanation that neither in the Covent Garden nor Southwark streets are any pipes laid down, save in the subways, *Bazalgette* 1568–1571.

No argument can be based upon the operation of the Covent Garden subway, and the limited use made of it, *Innes* 2103–2119. 2365——Inconvenience experienced by the men at work on the pipes in the Covent Garden subway, *Muir* 3465–3467——Limited period for which the gas and water pipes have been down in this subway, *ib.* 3774, 3775——Practice as to the inspection of the water pipes in the subway, *ib.* 3776–3780.

The Equitable Gas Company have two 5-inch mains in Covent Garden subway, both of which are laid underground, *Brothers* 4098–4101——Inconvenience if there were not two main pipes in the subway, *ib.* 4139. 4142, 4143. 4163–4166——The Equitable Company do not pay any rent for using the Covent Garden subway, and before using it stipulated that the pipes should be under the soil, *ib.* 4145, 4146. 4320–4322.

Absence hitherto of any accident in the Covent Garden subway, the pipes having been there more than two years, *Brothers* 4295, 4296——Sufficiency of the pipes in the Covent-garden subway for the supply of the street itself, but not for any further supply westward, *ib.* 4302–4311——Supply of the houses now built, and of the street lamps, without any repairs having yet been required by the pipes, *ib.* 4313–4319.

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5. *As to the laying of the Pipes underground in the Subway:*

Objection to the mode in which the pipes were laid by the companies, that is, with a covering of gravel over them, *Bazalgette* 121–124——Facility with which a certain small leakage of gas might have been detected if the pipe had been laid upon chains, *Marrable* 458. 623–626——Improvement if the pipes in the Covent-garden subway had not been laid under the surface, or covered with gravel, *Carpmael* 769–772; *Bramwell* 1851, 1852.

Reference to the circumstance of the gas pipes in the Covent-garden subway being underground, much as if they were laid in the street, *Hersey* 3818–3820——Object of laying the mains underground to prevent their being accidentally fractured, and to obviate the effluvia arising from the pipes, *Brothers* 4102–4114——Grounds for apprehending a fracture of the gas pipes in the subway if they had not been covered over, *ib.* 4164–4178.—*See* also *Ventilation.*

D.

Danger. See *Explosions. Leakage of Gas. Paris*, 2. *Safety Lamps. Suffocation of Workmen. Ventilation.*

Depth of Subways. Statement as to the depth from the surface of the street to the crown of the Metropolitan subways already made, or about to be made, *Hemans* 1231–1238.

Designs for Subways. Attention given by the Metropolitan Board to the subject of subways in 1859, when the matter was referred to a committee of eminent professional men, and premiums were given to persons submitting the best designs, *Bazalgette* 88–95—— Respects in which the plan of construction adopted by the Metropolitan Board is superior to the design which was awarded the first prize by the committee nominated by the Board in 1857, *ib.* 311–319.

Witness was one of the committee to whom it was referred to select the best designs submitted for a subway, *Hawkesley* 4953–4955——Explanation that as one of the committee of engineers who reported favourably upon some designs for subways, witness d d not in any way bind himself to an approval of the system for general adoption, *ib.* 5048–5053. 5061–5063.

Report by the committee appointed by the Board to consider the designs for subways in new streets in the metropolis, and to award prizes in respect thereof, *App.* 297, 298.

Districting Arrangement (*Gas Companies*). Effect of the districting arrangement to relieve considerably the number of openings in the streets, *Hawkesley* 4996-4998.

Durability of Pipes. Less liability to corrosion in subways than in the streets, *Marrable* 458, 459——Great endurance of pipes if laid in subways, *Tite* 737. 742——Much less liability of the pipes to corrosion than when buried underground, *Hemans* 1081, 1082. 1122. 1212, 1213——Advantage of the facility of painting the pipes in subways, *ib.* 1081, 1082——Great durability of the pipes by being exposed, and being painted from time to time, *ib.* 1212, 1213.

Less corrosion in a subway than in the ground, *Tarbotton* 1292——Limited duration of wrought-iron service-pipes as now laid; cast-iron pipes last much longer, *Bramwell* 1948, 1949——Great durability of pipes when laid in a subway, this being one of the advantages in respect of which the rental should be assessed, *ib.* 1953, 1954.

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EXPLOSIONS:

1. *Evidence on the part of the Promoters with respect to the Amount of Risk of Gas Explosions.*
2. *Evidence opposed to the Use of Subways on the ground of the increased Risk.*

1. *Evidence on the part of the Promoters with respect to the Amount of Risk of Gas Explosions:*

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Complaint in regard to the Gray's Inn-road being taken up at present by the New River Company, it having been paved in 1861 at a cost of 14,000*l.*: 971-977——Circumstance of Chancery-lane having also been opened from end to end by the New River Company twelvemonths after it had been repaved in 1862; 975. 978, 979——Information relative to the explosion in Holborn in 1862, when the London Gas Company were executing some works there, 980-986. 1018-1020——Great public convenience of subways, 987. 1041——Absurdity of constructing subways unless the companies use them, 988.

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Necessity of having a fire in a subway for making the lead joints; cement joints not being available in certain cases, *Muir* 3635-3648; *Brothers* 4140, 4141——Exceptional circumstances under which two lengths of pipes are now jointed above ground before being let into the trench, *Hersey* 3933-3935——The lead used in jointing must be melted in the street above, on account of the danger of a fire in the subway, *Hawkesley* 5021, 5022. 5093.

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Statement as to the varying internal pressure upon gas-pipes under different circumstances, 1631-1637. 1650. 1677-1679——Great leakage now arising from the joints and service pipes, whereas this would be speedily detected and prevented, if the pipes were exposed, as in subways, 1639-1650. 1718-1720. 1750——Absence of any accidents or explosions at the exposed pipes about the Commercial Gas Works, excepting those arising from gross carelessness, 1651-1654.

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The districts of the Lambeth Water Company includes about 250 miles of pipes, *Simpson* 2556–2563——There are eighty miles of street in Lambeth with only one pipe, and sixty-five miles with more than one pipe, *ib.* 2569.

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Leakage of Gas:

1. *Evidence in favour of Subways on the score of Leakage of Gas.*
2. *Evidence to a Contrary Purport.*
3. *Amount of Leakage under the present System.*

1. *Evidence in favour of Subways on the score of Leakage of Gas:*

Anticipated saving in respect of leakage of gas, by the introduction of subways, *Bazalgette* 200–275——Advantage of subways as greatly lessening leakages of gas and as facilitating the detection and correction of any leakage, *Marrable* 471–480. 550–555. 599–604——Pressure upon the pipes as now laid, *Tite* 737.

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LEAKAGE OF GAS—continued.

1. *Evidence in favour of Subways on the score of Leakage of Gas*—continued.

Any pipe which allows the gas to escape, except at the joints, must be a singularly bad one, *Carpmael* 775——Advantage of painting or coating the joints of gas pipes in subways with white lead, *ib.* 786, 787——There is in fact no leakage except at a breakage or an imperfect joint, *ib.* 896, 897.

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Great amount of leakage, varying from ten to twenty-five per cent. under the present system, *Jones* 1629. 1640–1644. 1661–1676——Great leakage now arising from the joints and service pipes, whereas this would be speedily detected and prevented if the pipes were exposed as in subways, *ib.* 1639-1650. 1718-1720. 1750.

2. *Evidence to a Contrary Purport:*

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Further statement as to the exudation of gas through the pipes, and as to the danger on this score in a subway, but not in the streets, *Brothers* 4179–4199. 4280-4284——In a subway the danger from exudation might be checked if the pipes were covered with clay, *ib.* 4235, 4236.

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3. *Amount of Leakage under the present System*—continued.

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Reasons for preferring water pipes in subways being underneath the surface, although the facility of inspection would be lost, 3649, 3650. 3733-3735——Necessity of a space of from twelve to eighteen inches round each pipe, according to its size, in order to admit of inspection and repair, 3657-3664. 3749-3753——Circumstance of the question of expense to the companies being a matter for arbitration under the Bill now before the Committee, 3670-3672——Particulars as to the large space required for the valves for the thirty-six inch pipes of the New River Company, 3673-3696——Necessity of ample space for the valves in connection with pipes in subways, 3697-3700.

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Frequent instances of fractures of water pipes, change of temperature being a chief cause, 3761-3765——Great number of stop-cocks attached to the pipes of the New River Company, 3766——Means for checking any continued overflow of water in Covent Garden subway if there were a burst there, 3767-3770——Very little ventilation in the Covent Garden subway, 3771-3775——Limited period for which the gas and water pipes have been down in this subway, 3774, 3775.

Practice as to the inspection of the water pipes in the subway, 3776-3780——Further evidence as to the danger of the leaden service pipes in subways being stolen, 3781-3790——The New River Company have not yet got near the maximum dividend under Act of Parliament, 3791-3793——Liability under the present system to gas explosions from leakages into sewers, 3796, 3797——Advantage of the water companies being able to carry mains along Southwark-street, 3798-3801.

[Second Examination].—Produces sundry returns relative to the pipes of the New River Company, 4651-4653, *and p.* 284-286.

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New River Company. Petition of this company against the Bill, *p.* 2.

Statement of the number of openings made by the company in the streets or pavements in St. Marylebone parish, in each of the years 1859-63, *p.* 4——Number of openings by the company in the streets of St. Martin's-in-the-Fields in each of the years 1856-63, *ib.* ——Return of openings made by the company in the streets of the Holborn district during the several years 1859-63, *ib.* 5.

Evidence as to the injurious interference of the New River Company with the Holborn district in 1863 and 1864, regardless of the public convenience, *Isaacs* 971-979. 1024-1033.

The New River Company is the largest water company in the metropolis, and supplies about 112,000 houses, *Muir* 3412-3414——Very extensive pipeage of the company; there are eighty-seven miles in which there are two lines of pipes, and forty-six miles with more than two lines, *ib.* 3415-3420——The mere cost of the pipes is about 600,000*l.*, *ib.* 3421, 3422.

Witness would gladly recommend the adoption of the subways by his company if he thought they would be useful and safe, *Muir* 3423, 3424——Unwillingness of the company to lay their pipes in the Covent Garden subway; circumstances under which they were induced to do so, *ib.* 3448, 3449——Great number of stop-cocks attached to the pipes of the company, *ib.* 3766 ——The company have not yet got near the maximum dividend under Act of Parliament, *ib.* 3791-3793.

Estimates of the probable effect, in the average of years, of subways upon the New River Company's annual expenditure, *p.* 284——Lengths of the larger mains which the company have laid in the public ways of the metropolis, *ib.* 285.

See also *Covent Garden Subway*, 4.

New Streets. The subways in the new streets near Covent Garden and in Southwark are the only two yet constructed in the metropolis, *Bazalgette* 108——Statement as to the present Bill referring only to subways in new streets, *ib.* 397-400. 407——Witness submits that there are very strong reasons for the formation of subways in new streets, such as

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as the street to be made along the Thames Embankment and to the Mansion House *Tite* 638, 639——Statement as to the Bill being contemplated chiefly or entirely for new streets, *ib.* 653–658. 699–711. 724–729——Very gradual progress likely to be made in the construction of new streets and of subways, *Hemans* 1054. 1070.

Nottingham:

Witness has inspected the subway at Nottingham, and testifies to its satisfactory operation, *Marrable* 502–515——Size of the pipes in the Nottingham subway; belief that the companies there make no objection to use the subway, *ib.* 607–609——Reference to the two subways in Nottingham as being very short ones, but as satisfactorily illustrating the safety of gaspipes in subways generally, *Hemans* 1123–1129.

Witness, who is surveyor to the Corporation of Nottingham, has long considered the question of subways altogether, irrespectively of the Metropolitan Board of Works, but is engaged by the Board on the present occasion, *Tarbotton* 1283–1287. 1440–1443. 1481, 1482——Good ventilation in the subways at Nottingham and in London, *ib.* 1296——Detailed explanation of the subways formed in two new streets at Nottingham, under the superintendence of witness; several advantages thereof with reference to the gas and water pipes laid therein, *ib.* 1301 *et seq.*

Means for the ventilation of these subways; sufficiency thereof, *Tarbotton* 1305, 1316–1321. 1350–1356——Adequate width of the subways, though considerably narrower than that near Covent Garden, *ib.* 1322. 1473——Arrangements contemplated in regard to a third subway at Nottingham, where the depth is limited, *ib.* 1332.

Examination in reply to sundry exceptions taken to the Nottingham subways, and their operation with regard to the gas and water pipes, *Tarbotton* 1323–1340. 1384 *et seq.*——Limited length and size of the subways, and of the mains in them, *ib.* 1339–1345. 1408–1412. 1473——The pipes were laid by the gas and water companies themselves, and no complaint has yet arisen either as regards ventilation, gas leakage, or any thing else, *ib.* 1347–1358. 1363——Very uniform temperature in the subways, *ib.* 1351, 1352. 1505, 1506.

Intention of the corporation of the town to introduce subways into all new streets, on account of the experience of the two subways now in operation, *Tarbotton* 1359–1361——Statement as to no charge being made to the companies for the use of the subways, which are used by them unwillingly, *ib.* 1392–1401——Compulsory powers were not taken by the corporation to compel the use of the subways, *ib.* 1396–1398.

Calculation that the subways in Nottingham, if constructed of new materials in an ordinary street, would have cost about 3 *l.* 11 *s.* 6 *d.* per yard; this is exclusive of the cost of the side passages to the houses, *Tarbotton* 1444–1450——Larger increase of ventilation provided in the subways at Nottingham than in London, *ib.* 1460–1466——The water and gas services in the Nottingham subways have been in full operation for twelve months or more, *ib.* 1503, 1504. 1507.

With regard to the Nottingham subway, it is altogether too short to draw any general inferences from, *Innes* 2099–2102. 2364.

Witness is engineer to the Nottingham Gasworks and Waterworks, *Hawkesley* 4945, 4946——Very small size of the Nottingham subways, and of the pipes, *ib.* 4960. 5015. 5035–5037——There are only two 4-inch pipes in the subway, *ib.* 5015——Exceptional circumstances under which witness advised the companies at Nottingham to place their pipes in the subway there, *ib.* 5035–5039. 5083–5085——Absence of accident at Nottingham; smallness of the supply of gas adverted to hereon, *ib.* 5064–5069.

O.

Old Streets. Great advantage if there were subways under all the streets, *Bazalgette* 344——With regard to subways under old streets, Parliamentary sanction must first be obtained, and the present Bill relates only to subways under new streets, *ib.* 397–400. 407——The cost and inconvenience of constructing subways in old streets will probably prevent any such attempt being made for many years, *Marrable* 452, 453.

It is very unlikely that the Metropolitan Board should ever introduce subways into old streets, *Tite* 639——Explanation as to the Bill being intended to apply to all new streets which may be formed, whilst in the case of the old streets further Parliamentary sanction must be obtained, *ib.* 653–658. 699–711. 724–729. 747, 748——Objection to the Bill being excluded from applying to old streets *ib.* 699–717——In the case of old streets, it would be unreasonable to ask a rent for the subway, on account of the cost to which the companies would be put to in taking up and relaying their mains, *ib.* 740.

Absence of any power to put subways in old streets, so that the question of removing the pipes in those streets does not arise, *Hemans* 1071.

Old Streets—continued.

Statement by the Committee that the opposition to the Bill need not be directed to the question of old streets, or streets in which there are no subways at present, *p.* 116.

Openings in the Streets:

1. *Number, Character, and Expense of the Street Openings under the present System.*
2. *Effect of the Intoduction of Subways.*

1. *Number, Character, and Expense of the Street Openings under the present System:*

Witness produces returns obtained from various parishes, showing the annual number of applications for openings in streets by the gas companies and water companies, *Fry* 1 *et seq.*——Witness, who is in the solicitor's department of the Metropolitan Board of Works, cannot supply any details in connexion with the character of these openings, *ib.* 45–62——Probabillty of many of the openings having merely been a foot or two long for the purpose of laying service pipes, *ib.* 47–54——Effect of any competition between the gas companies in accounting partly for the large number of openings, *ib.* 54–56.

Liability of the companies for the repair of the road, *Carpmael* 829–832——Permanent injury to the roadway when trenches have once been opened in it, notwithstanding the provision that the companies must restore it to its former condition, *Isaacs* 969. 971. 975. 979. 1035–1039——Inconvenience now occasioned to shopkeepers and the public when the streets are opened for any long period, *Innes* 2240–2253.

Large proportion of the openings in the streets which are of a very diminutive kind, *Greeves* 2347, 2348——Information relative to the openings made in the streets by water companies under the existing system; large proportion of these which are of a very small and non-obstructive character, *Simpson* 2646–2665——Openings are much more frequent in the case of gas than of water, *ib.* 2666——Character of the obstruction now occasioned to the traffic when new water mains are being laid or relaid, *ib.* 2929–2945.

Admission as to the large number of openings now made in the streets by the New River Company; the average size of them is, however, very small, *Muir* 3546–3559——Notice given to the parish of each opening to be made, except in cases of emergency, when an account is always given afterwards, *ib.* 3550–3553.

Particulars as to the annual cost of repaving in certain leading thoroughfares supplied by the Imperial Gas Company; average of 4 *l.* 15 *s.* per mile over the whole district for all openings for new mains or services, *Harvey* 3863–3878——Aggregate sum paid in the last three years for all openings for old mains and for new mains respectively, *ib.* 3879–3884——Very small and unimportant character of many of the openings, *ib.* 3885–3888.

Further explanation as to the item of expense, on the score of relaying the streets, and as to the contract prices with the parishes by which the work is done, *Hersey* 3976–4004——Number of openings made for gas pipes in the roadway and footway respectively, *ib.* 4081.

Applications for opening the streets in the City are made through the office of the Commissioners of Sewers for the City of London, *Hayward* 4419–4421——Very large number of openings in the City by the water, gas, and telegraph companies, *ib.* 4422–4423——Expenditure in the City in each of the last three years in the restoration of the payments; this is much less than might be supposed, *ib.* 4476–4482.

2. *Effect of the Introduction of Subways:*

Witness considers the system of subways the most efficient remedy for the inconvenience now experienced, with such improvements in construction as experience may suggest, *Carpmael* 759–761.

Several purposes, as in the case of fire-plugs, hand-plugs, and cock-boxes, for which the surface must still be opened, even if the mains were in a subway, *Simpson* 2673–2677——Necessity of many of the openings being continued, even if subways are used, *Greaves* 4349–4351.

Attention given by witness to the subject of subways, on account of the inconvenience now experienced, *Haywood* 4424, 4425——Anticipated reduction in the number of openings in the streets by the companies, *ib.* 4476.

Witness would strongly favour any measure which would obviate the breaking up of the streets in laying gas and water pipes, *Hawkesley* 4950——Conclusion that the system of laying the pipes in the streets must still be pursued, but that the inconvenience may be much mitigated, *ib.* 5045.

See also *Chancery Lane. Gray's Inn Lane. Holborn District. New River Company. Phœnix Gas Company. Public, The. Ratepayers. Repaving of Streets. Traffic.*

Report, 1864—*continued.*

Ormond-street Explosion. Reference to the Ormond-street explosion several years ago; its origin, *Upward* 1778–1781.

P.

Paddington. Total of 9,225 street openings in the last five years, by the gas and water companies, in Paddington parish, *Fry* 42–44. 58.

PARIS:

1. *Generally as to the Character of the Subways, the Use now made of them, and the Experience derived.*
2. *Particulars in connexion with Explosions in the Sewers or Subways.*
3. *Views of the Engineers of Paris adverse generally to the use of Subways for Gas Pipes.*

1. *Generally as to the Character of the Subways, the Use now made of them, and the Experience derived:*

Reference to the mode of construction of the two subways in Paris; a gas pipe has been laid down in one of them, and water pipes in the other, *Bazalgette* 163–172——Examination as to the limited use hitherto made of subways in Paris, *ib.* 173–193——Reference to the subways, or rather large sewers, in Paris; defects of their construction, so that there is hesitation about the introduction of gas pipes into them, *Tite* 650–652. 751——Inconvenience of the subways or sewers in Paris for laying water and gas pipes, *Carpmael* 821–826——Further reference to the subways in Paris, and the use made of them; belief as to there being gas and water pipes in the same subway without any injury to the latter, *ib.* 850–859. 922–935.

Witness has recently visited the subways in Paris, in company with Mr. Bramwell; was employed in the matter by the Metropolitan Board of Works, *Hemans* 1045–1047. 1136. 1169. 1241–1244——No danger or difficulty has been experienced in the case of the subway in Paris, where gas pipes have been in use for nine years; satisfactory conclusion arrived at thereupon by Mr. Bramwell and witness, *ib.* 1098–1103——Examination with further reference to the subways in Paris, and the circumstance of the two engineers there being opposed to the introduction of gas pipes, because they had been informed (erroneously) that explosions had arisen in consequence, *ib.* 1136–1170. 1239–1245.

Witness has visited the subways in Paris, *Bramwell* 1805——Way in which the water pipes are laid in one of the Paris subways, also used as a sewer, *ib.* 1865–1868——In one of the Paris subways witness saw a gas pipe, as well as a water pipe, and was told no accident or difficulty had ever occurred, *ib.* 1869–1872——From the experience gained in Paris witness draws favourable inferences as regards gas pipes in subways, although the engineers there are of a different opinion, *ib.* 1873–1874.

Unsatisfactory results in the case of a subway or sewer in Paris, in one of the streets near Montmartre, in which water and gas pipes were laid, *Simpson* 2573–2577——Witness twice attempted, some twelve years ago, to inspect the subway near Montmartre, but the place was too dangerous on account of the gas leakage, *ib.* 2574–2577.

Further evidence on the subject of the subway or sewer near Montmartre, and the unfavourable conclusion drawn by witness from laying gas and water pipes in it, *Simpson* 2780–2798——Consideration of the use now made of the sewers for conveying water in pipes from the well of Grenelle and the Canal de l'Ourcq; size of the pipe used, *ib.* 2799–2827. 3034–3038——Size and character of the Paris subway seen by witness further adverted to; there is a distinct smell of deleterious gas, *ib.* 3094–3142.

Witness has visited the subways in Paris several times, and has been in communication with different engineers connected with these subways, *Haywood* 4426–4430. 4488–4490——The Paris subways fulfil the double object of carrying off the sewage, and providing for the gas and water pipes, *ib.* 4431——The ventilation of the Paris subways or sewers is much superior to that of the London sewers, *ib.* 4432. 4434.

Few pipes now in the Paris subways, these, moreover, being laid under conditions not at all analogous to the case of the London subways, *Haywood* 4441–4443——In the best streets, and in the new streets, the pipes are laid just as in London, *ib.* 4443–4445——Witness found no objection to the laying of water pipes in the Paris subways, *ib.* 4622–4625——Superior construction of the Paris subways or sewers as compared with the London subways; the ventilation also is very good, *ib.* 4626–4628. 4643–4651——Advantages of placing water pipes in the sewers in Paris, instead of in actual subways, *ib.* 4690. 4694. 4701——Greater facility of inspection of the pipes in the sewers of Paris than in subways, *ib.* 4694–4697.

Advantage of the large size of some of the Paris sewers, with reference to the laying of pipes in them, *Belgrand* 4736–4738——Arrangement in the subways for the water escaping in the event of a pipe bursting, *ib.* 4747——Period for which the pipes have been in the subway in the Quai Martier; size and ventilation of this subway, *ib.* 4751

Report, 1864—*continued.*

PARIS—continued.

1. *Generally as to the Character of Subways, &c.*—continued.

4754—— Use of one sewer for the several telegraph wires, *Belgrand* 4756——Size and length of the largest water pipes in the sewers; mode of introducing and repairing them, *ib.* 4759-4763——There is only one gas company in Paris, and the pipes are now laid as formerly, *ib.* 4764, 4765.

2. *Particulars in connection with Explosions in the Sewers or Subways:*

Explanation relative to an inquiry by Mr. Bramwell and witness into the matter of the two reputed explosions in the Paris subways, when they ascertained beyond doubt that the explosions occurred from gas escapes in sewers altogether away from the subways, *Hemans* 1086–1105. 1136-1170. 1239-1245.

Evidence in confirmation of the statements of Mr. Hemans as regards the Paris subways, that certain explosions did not occur in the subways at all, *Bramwell* 1853–1864. 1873.

Serious explosion in one of the Paris sewers, that is, in Rue des Martyrs, which was attributed to an escape from the gas pipe, so that the pipeage was removed, *Haywood* 4437-4449——There was also an explosion in the square of the Louvre, *ib.* 4440. 4618, 4619——Further information in connection with the explosion in the Rue des Martyrs; authority for the conclusion that it arose from an escape of gas, *ib.* 4594–4621.

About 2,150 metres of gas pipes have been laid down in Paris, 750 metres of which in the subway of the Rue des Martyrs have been taken up in consequence of explosions, *Belgrand* 4657-4663——There are about 800 metres of gas pipe in the Place Napoleon III.; there have been explosions there also, *ib.* 4660, 4661. 4664——Very serious explosion on the 5th March last in the subway of the Bridge of Austerlitz; size of this subway, *ib.* 4664-4668——Numerous instances of explosions and accidents in the sewers of Paris from leakages of gas into the sewers from adjacent pipes, *ib.* 4669–4677.

Information in connection with the explosions in the Place Napoleon III., *Belgrand* 4705-4717——The majority of the explosions have been caused by gas penetrating into the sewers from pipes in the adjacent soil, *ib.* 4718, 4719——The explosion in the Rue des Martyrs in 1831 or 1832 was caused by an escape from the pipe in the subway itself, *ib.* 4720-4724——Explanation as to the gas pipes in the subway of the Pont Austerlitz not having been removed since the explosion, *ib.* 4744-4746——Personal injuries inflicted by the explosions, *ib.* 4748.

3. *Views of the Engineers of Paris adverse generally to the use of Subways for Gas Pipes:*

Conclusion arrived at by the Paris engineers, M. Belgrand and M. Gallait, that in consequence of the reported explosion, it was dangerous to have gas pipes in subways; examination as to the erroneousness of this view, *Hemans* 1086. 1096. 1136-1170. 1239-1245——Circumstance of the subordinate engineer in charge of the gas pipes in the Paris subway having had no objection to the introduction of the pipes, *ib.* 1245-1247.

Strong objection entertained by M. Corôt, engineer in Paris, to the use of subways for gas pipes, *Simpson* 2574. 2577——The chief engineer of Paris and the other engineers whom witness saw there are adverse to the laying pipes in the subways or sewers, *Haywood* 4435-4439—— Capacity for the pipes in the Paris subways, the engineers, however, being opposed to their introduction, *ib.* 4447, 4448——Positions occupied by the engineers in Paris, whom witness has communicated with on the subject of the subways there, *ib.* 4585-4593.

Concurrence of opinion between the municipal engineers in Paris as to the danger of using subways for gas pipes, *Belgrand* 4678. 4680. 4702-4704——Opposition made in Paris to the laying of gas pipes in sewers, even when these are of the largest dimensions, *ib.* 4684. 4687. 4698——Determination at present in Paris not to introduce gas pipes into sewers or subways; witness, however, does not despair of means being devised for obviating the danger, *ib.* 4742, 4743.

Strong feeling on the part of the officers of the Paris Gas Company against laying pipes in subways, *Barlow* 4790–4800.

Petitions. List of petitions against the Bill, *p.* 1, 2.

Phœnix Gas Company. Extensive character of the Phœnix Gasworks on the Surrey side of the river, *Innes* 1956–1958—— Numerous pipes laid down by the Phœnix Company in some thoroughfares; question hereon as to the number and size of the pipes required by the Company in Southwark Street, *ib.* 2018–2024. 2166–2203. 2262–2302. 2374–2403. 2437–2452——Ruinous expense to the Phœnix Company as regards the Southwark-street supply, if compelled to pay a rent of 4*l.* per cent. upon the cost of the subway, *ib.* 2068–2073.

The rental of the Phœnix Company is 144,000 *l.* a year, and the loss from leakage is about 5,000 *l.* or 6,000 *l.*, *Innes* 2130-2133. 2417-2419. 2453-2455 —— Average of 698 *l.*

Phœnix Gas Company—continued.

698 *l.* a year as the cost incurred by the Phœnix Company in laying and relaying mains and service pipes, and in paving, during the last three years, *Innes* 2153-2161.

Explanation as to the number and size of the mains of the Phœnix Company in Stamford Street, with reference to the number and character of the mains required in Southwark Street, *Innes* 2166-2203——Circumstance of the Phœnix Company being the only gas company to use the Southwark Subway, under the districting arrangement of 1860, *ib.* 2254-2261. 2400-2403——Numerous applications made yearly by the Phœnix Company for opening the streets; simple form or notice used on these occasions, *ib.* 2404-2409.

See also *Southwark Street Subway*, 1.

Pneumatic Despatch Tubes. Advantage of a pneumatic despatch tube and a subway, when in the same street, being constructed together, *Bazalgette* 361-364——There would be no practical difficulty in making a subway capable of admitting pneumatic despatch pipes, *Marrable* 463, 464. 598——Inconvenience in opening Holborn for the pneumatic tubes; these should be required to use subways, *Isaacs* 1039-1041——Special arrangements necessary in cases of pneumatic tubes or underground railways in addition to subways, *Hemans* 1106, 1107——Large space required for atmospheric or pneumatic despatch tubes, *Hawkesley* 5001.

Preamble of the Bill. Proposal by the Committee as to the wording of the preamble of the Bill, *p.* 287.

Pressure (*Gas and Water Pipes*). Considerable pressure which water pipes are constructed to resist, adverted to with reference to the angles in pipes at different levels, *Simpson* 2874-2881——Character of the pressure test applied in the case of gas pipes, *ib.* 2882-2886.

Price of Gas. Effect of an increase of expense, if subways be adopted, in leading to an increased charge to the public for gas, *Hawkesley* 4972-4974.

Public, The. Increasing inconvenience in the absence of subways on account of the augmentation of works underground and of traffic on the surface, *Bazalgette* 139, 140——Serious inconvenience to which the public are now subjected through the breaking up of the streets, in order to lay down gas pipes, *ib.* 144, 145.

Absence of any inconvenience to the public in carrying pipes into subways already constructed, *Marrable* 454, 455——Great inconvenience to the public through the frequent breaking up of the roads under the present system, the pipes moreover being hastily and imperfectly laid, *ib.* 599. 650——Great public inconvenience of subways, *Isaac* 987. 1041.

If the subways are for the convenience of the public, the public should pay for them, *Simpson* 2772, 2773——Opinion that the public would in the end be losers if the companies are forced into the subways, *Muir* 3568.

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Ratepayers. Authority of the Metropolitan Board for bringing in Bills at the cost of the ratepayers, *Tate* 659——Suggestion that not only the companies, but the general ratepayers of the metropolis should contribute to the cost of subways, and that the amount of benefit and of contribution in each case should be decided by arbitration, *Carpmael* 840. 888-893. 943-953——Benefit to the ratepayers by reason of the streets not being broken up nor the traffic interrupted, *ib.* 840. 888-891. 944-953——Sense in which the cost of the subways to the companies may be said really to fall upon the ratepayers; that is, in the price paid by them for gas or water, *ib.* 888-893. 936-938.

Receivers (*Gas Pipes*). Arrangements of the Imperial Gas Company in regard to purifying the water from the receivers attached to the pipes; large number of receivers, *Hersey* 4086-4088. 4091.

Removal of Pipes and Mains. Probability of the companies being put to heavy expense if required to remove their mains into subways, which may be formed in any existing streets, *Bazalgette* 263-274——Question as to the means of supplying the public whilst mains are being removed from the streets into the subways; there are doubtless various modes of doing it, *ib.* 277-280. 414-417——Considerable expense to the companies if they were required to remove pipes already laid down in streets into subways, *Hemans* 1189-1197——Power under the Bill, if subways are made in existing streets, to compel the companies to remove their pipes from their streets into the subways at their own expense, *Bazalgette* 1572-1574——Great experience if the existing mains in streets had to be removed into subways, *Barlow* 4795, 4796.

Rent. Conclusion as to the fairness of the proposal that the companies should pay a rental for the use of the subways, on account of the advantages derived, *Bazalgette* 275, 276. 281–286——Instead of a hardship, it will be a saving to the companies to use the subways, *ib.* 401–403——In the case of subways in new streets, witness further states that companies will save by using them at a rental, *ib.* 418–420——Witness contemplates that the companies should pay for the supervision or maintenance of the subways used by them, *ib.* 421–427——It never occurred to witness that the companies should pay the cost of the subways or the interest on the cost, *ib.* 421–423.

Reasonable arrangement proposed in regard to the payment to be made by the companies for the use of the subways; provision as to arbitration in the event of difficulty, *Tite* 648, 649——The subways would be a great saving to the companies, so they ought to pay for them, *ib.* 648. 681——The annual interest on the cost per mile is about 600 *l.*, which would be divided between the two sides of the road, *ib.* 648——Data upon which witness places the rent at 600 *l.* a mile, *ib.* 663–669. 682–685.

Dissent from the view expressed by Mr. Bazalgette that the companies should pay only for the maintenance of the subways, *Tite* 677–681——Further consideration of the principle or data to be had in view in settling the amount of rent or contribution to be levied on the companies; fairness in their being required to pay for the advantages obtained, *ib.* 682–698. 730–746.

Assumption of four per cent. per annum as a proper representation of the outlay to be apportioned between the companies and the ratepayers, *Carpmael* 891. 943–948——Witness has not studied the question of cost or rental, but considers that the companies should pay a rent in proportion to the advantages derived, *Bramwell* 1934, 1935. 1942–1947. 1954——At 5 *l.* per foot the interest on the outlay would, at 4 *l.* per cent., amount to about 1,000 *l.* per mile per annum, *Simpson* 2751–2753.

Statement by counsel for the promoters, that they are quite ready to insert a proviso that they should not claim at any one time more than 4 *l.* per cent. upon the outlay, *p.* 57.

See also *Arbitration.* *Compulsory Powers.*

Repair of Pipes. Objection to subways on the ground of the difficulty of making repairs when leakages occur, on account of the risk of explosion, *Barlow* 4779–4785.

See also *Labour and Workmanship.* *Size of Subways.*

Re-paving of Streets. Rates paid by the Equitable Gas Company to the parishes for the re-paving of the streets, *Brothers* 4250–4257——*See* also *Openings in the Streets.*

Roof of Subways. Obstacle to laying a gas pipe along the roof of a subway, *Brothers* 4144, 4145.

S.

Safety Lamps. In the event of escapes of gas in subways, safety lamps might be easily used, *Hemans* 1114. 1229, 1230——Witness has invented a safety lamp, by the use of which the danger of repairing gas pipes by artificial light may be entirely obviated; supplies detailed information as to the construction of this lamp, and its advantages for use in subways, &c., *Armstrong* 1509 *et seq.*——Doubt as to its being safe to use the so-called safety lamp in subways, *Simpson* 2603, 2604——Reference to the proposed use of safety lamps, &c., as an admission of danger, *Muir* 3746–3748.

St. James's, Westminster. Total of 9,445 openings of the streets in five years in St. James's, Westminster, *Fry* 36–38. 58.

St. Martin-in-the-Fields. Reference to the return from the parish of St. Martin-in-the-Fields, as showing a total of 10,337 openings in the streets, or applications for openings, in the years 1856–63, *Fry* 3–19. 58.

Service Pipes. Facility by means of side galleries, as in the Covent Garden subway, of laying down service pipes into the cellars of the houses, without disturbing the surface at all, *Bazalgette* 101–104. 112–116. 308–310——In the subways now made there is a separate supply or service pipe for each house, with a side gallery to every two houses, *Carpmael* 872–879——Efficiency of the plan invented by Mr. Upward for attaching gas service pipes to mains without any escape arising during the operation, *Hemans* 1130–1133.

Explanation of a method invented by witness for connecting service pipes with the mains without allowing any escape of gas; advantage of using this plan in subways, *Upward* 1759–1777. 1786–1796.

Difficulty and expense in connecting the service pipes with the main in the subway longer service pipes required than under the present system of service mains for local purposes, *Innes* 2074–2082——Great inconvenience in subways in regard to branch pipes,

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pipes, *Bateman* 3140——Want of space in order properly to connect the branch or service pipes with the main, *ib.* 3255-3264——Probable saving to the householders in regard to the service pipes and the cost of excavtion, if subways be adopted, *Muir* 3523-3529.

Several causes which render it more expensive in a subway to connect the service pipes with the mains, *Brothers* 4258-4274——Amount of inconvenience caused by shutting off the gas in the main when a service pipe is being connected, *ib.* 4297-4301——Difficulty and danger in connecting service pipes with the main in a subway, *Hawkesley* 5018-5026.

See also *Chipping.* *Connection of Pipes.*

Sewers. Sewers may with every facility be laid under the subway without any interference with the pipes, *Tarbotton* 1299——Frequent subsidence of the soil through the opening of the streets for sewers; leakage arising through the consequent strain upon the pipes, *Innes* 2360-2363——Frequency of injury to water and gas pipes through a subsidence of the soil after sewers have been formed, *Simpson* 3007-3022.

Objections to openings from the subways into the sewers, *Bateman* 3386-3388——Liability under the present system to gas explosions from leakages into the sewers, *Muir* 3796-3797.

Evidence as to the occurrence of explosions in the City sewers, and as to several persons having been injured thereby, *Haywood* 4457-4461. 4464. 4545-4572——Cause of the explosions through the gas permeating through the soil, or escaping into the sewers through the joints of the pipes where they pass through the ventilating shafts, *ib.* 4572-4576. 4629-4632.

See also *Paris.*

Simpson, James. (Analysis of his Evidence.)—Has had a very extended experience as a civil engineer; is engineer to the Chelsea and Lambeth Waterworks Companies, and to several other Water Companies in different parts of the Kingdom, 2549-2553——District supplied by the Chelsea Company; it comprises about 200 miles of pipeage, 2554, 2555——District of the Lambeth Company; this includes about 250 miles of pipes, 2556-2563——In the Chelsea district there are about seventy miles of street in which only one pipe is laid, and forty-sixty miles in which there are two or more pipes, 2565-2568——In Lambeth there are eighty miles of street with only one pipe, and sixty-five miles with more than one pipe, 2569.

Witness has no prejudice whatever on the question of subways, and would gladly adopt them if advantageous to the Water Companies and the public, 2570, 2571——Unsatisfactory results in the case of a subway or sewer in Paris, in one of the streets near Montmartre, in which water and gas pipes were laid, 2573-2577——Witness twice attempted, some twelve years ago, to inspect the subway near Montmartre, but the place was too dangerous on account of the gas leakage, 2574-2577——Strong objection entertained by M. Carôt, engineer in Paris, to the use of subways for gas pipes, 2574. 2577.

Statement as to the liability of gas pipes to leakage throughout the whole length of the pipe as well as at the joints; danger on this score in subways, 2578-2592——Possibility of the atmosphere in subways becoming so impure from filtrations of gas from the surrounding soil that workmen could not exist in them; case in point, 2593-2598. 2616-2623——Great danger of explosion in subways, coal-gas being liable to explode at a very low temperature, 2599-2603——Doubt as to its being safe to use the so-called safety lamp in subways, 2603, 2604.

Great difficulty in getting work done properly by artificial light, 2905-2608. 2610-2612——Impossibility of securing perfection throughout all the processes of manufacturing and laying the pipes, 2606. 2610-2612——Necessity of paying workmen additional wages when they work by artificial light or underground, 2609-2615——Reference to a subway constructed by witness under Piccadilly and the Marble Arch; extra wages in this case, 2614, 2615——Probability of gas leakage in vaults or cellars getting into the subways through the side entrances intended for ventilation; frequent instances of gas escapes in coal-cellars and of accidents in consequence, 2623, 2624.

Grounds for concluding that the walls of the subways are likely to subside, and that gas may filter through from the soil, 2625-2633——Conclusion as to the inadequacy of the gratings and shafts for ventilating the subways; further insufficiency of the ventilation when the houses on each side are built, 2634-2644——Great obstruction to traffic if subways had to be enlarged in order to accommodate more pipes; probability of this, 2645. 2945——Information relative to the openings made in the streets by Water Companies under the existing system; large proportion of these which are of a very small and non-obstructive character, 2646-2665——Openings are much more frequent in the case of gas than of water, 2666.

Great durability of water-mains, so that it is rarely necessary to open the roads to lay new ones, 2667-2671——Rare instances of mains leaking, or of openings on this score,

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2671, 2672——Several purposes, as in the case of fire-plugs, hand-plugs, and cock-boxes, for which the surface must still be opened, even if the mains were in a subway, 2673-2677——Difficulty as regards the fire-plugs coming to the surface if the pipes were in a subway; tremulous motion produced by the heavy traffic of the streets adverted to hereon, 2677-2682.

Large size of some of the mains of the Chelsea and Lambeth Companies, the former Company using in some streets pipes for filtered and for unfiltered water, 2683-2688—— Necessity of about twelve inches space round the sockets of the pipes, in order to admit of the men working at them, 2689-2692. 3026——Great trouble in getting large pipes into a subway, and in jointing them there; the expense would be from 18 to 25 per cent. more than by laying in the ordinary way, 2693-2703.

Effect of a new street, with a subway, in dislocating the system of inter-communication of the water-mains already laid; great difficulty apprehended on this score, 2704-2722. 2758-2764——Necessity of newly-designed pipes and special castings on account of the difference of level in subways, 2708-2717——Liability of the service-pipes in subways to be frozen, 2723-2726——Difficulty as regards repair, and probabilty of much damage, in the event of a water-main bursting in a subway, 2727-2744.

Expediency of an understanding as to the liability for damages in case of accidents in a subway, 2739-2742——Estimate of 7 *l.* 10 *s.* per foot as the cost of a subway in Southwark Street sufficiently large for all the pipes likely to be laid there, 2745-2751 ——At 5 *l.* per foot, the interest on the outlay would, at four per cent., come to about 1,000 *l.* per mile per annum, 2751-2753——Liability of the leaden pipes to be stolen if in subways, 2754-2757.

Witness further expresses his belief that no advantages are likely to arise to the Water Companies from the use of subways, and submits that their utility and safety should first be proved by experiment, 2765-2779——If the subways are to be for the convenience of the public, the public should pay for them, 2772, 2773.

Further evidence on the subject of the subway or sewer near Montmartre, in Paris, and the unfavourable conclusion drawn by witness from laying gas and water pipes in it, 2780-2798——Consideration of the use now made of the sewers in Paris for conveying water in pipes from the well of Grenelle and the Canal de l'Ourcq; size of the pipes used, 2799-2827. 3034-3038.

Greater liability of the service pipes to freeze when in subways than in the soil, further adverted to, 2828, 2829. 2848, 2849——Further consideration of the question in regard to the probability of the leaden pipes being stolen, on account of their greater accessibility when in subways, 2829-2844——It is for those promoting the compulsory use of subways to prove that they are practicable and advantageous, without throwing upon the companies the devising of expedients for the removal of difficulties, 2844-2847. 2927, 2928.

Further statement relative to the subway running under the Marble Arch; way in which the water pipe in it is laid, 2850-2865. 3107——Character of the difficulty as regards the water supply in the streets running at right angles with, and intersected by, the Southwark subway, 2866-2881——Considerable pressure which water pipes are constructed to resist, adverted to with reference to the angles in pipes at different levels, 2874-2881——Character of the pressure test applied in the case of gas pipes, 2882-2886.

Witness further shows that gas pipes are subject to leakage, not only at the joints but through the porosity of the pipes themselves; difficulty of securing that this shall be prevented by more perfect manufacture, 2887-2895. 3046-3050——Improvement of late years in regard to the amount of gas leakage; twenty years ago it was probably 25 per cent., 2896, 2897. 2907-2912——Circumstance of some of the clauses of the Metropolis Gas Act not being observed under the present system in regard to the joining of the pipes before they are laid, 2898-2906.

Possible advantage on the score of facility of inspection and of detection of leakage in a subway; practice hereon at present, 2913-2921——Futility of any mechanical contrivance for aiding the ventilation, 2922-2924——Means of preventing the subways from being flooded through pipes bursting; efficient system of traps necessary, 2925-2927. 3039, 3040——Character of the obstruction now occasioned to the traffic when new water mains are being laid or relaid, 2929-2945——Further evidence relative to the insufficiency of the Southwark subway, as the street will probably be a leading thoroughfare, and several large pipes will be required, 2945-2976. 3025.

Instances of gas escapes in cellars from various causes, and of accidents therefrom, further adverted to, 2977-2986——Question as to the mode of laying the pipes in the Southwark subway considered with reference to the size of the subway, 2987-3006, 3023-3033——Frequency of injury to water and gas pipes through a subsidence of the soil after sewers have been formed, 3007-3022——Necessity of all the arrangements in connection with the Southwark subways being completed and in operation before

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before its practical utility can be proved, 3041-3045——Even after several subways have been made with increased improvements, witness doubts whether it will be desirable to use them, 3045.

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Size and character of the Paris subway seen by witness further adverted to; there was a distinct smell of deleterious gas, 3094-3102——Injurious effect upon the health when lead pipes are used where the water contains free carbonic acid, 3103-3106——The great majority of the service pipes in London are lead, 3104——With regard to the proposed shafts at each end of the subways, they are but an apology for ventilation; nor will a multiplication of openings along the streets render the ventilation efficient, 3109-3113.

Size of Subways. Interval desirable between the several pipes, with a view to their being readily accessible for inspection or repairs, *Carpmael* 902-906. 910, 911——Special arrangements to be made in any subway in which it is anticipated that several pipes may be laid, *ib.* 903-906. 939-942——Ample room for several pipes, more especially if the water pipes be put slightly underground, as in the Covent Garden subway, *Hemans* 1077 1078. 1122. 1212, 1213——Absence of difficulty in so constructing and arranging a subway that it may contain several pipes for various purposes, *Tarbotton* 1365-1367. 1500——Dimensions of subways adverted to with reference to the number and size of the pipes to be accommodated, *Bramwell* 1923-1934.

Consideration of the question as to the free space required around each main in a subway for operations, *Innes* 2064, 2065. 2204-2216——Difficulty on account of its being necessary to leave a space of about eighteen inches round each main for the men to work in, *ib.* 2064, 2065. 2091-2094——Difficulty in estimating, beyond ten years, the size of the mains sufficient to be laid down in new streets or subways, *ib.* 2434-2436——Necessity of about twelve inches space round the sockets of the pipes in order to admit of the men working in them, *Simpson* 2689-2692. 3026.

Necessity of looking to the future with respect to the possible number of water mains to be introduced into new streets with subways, *Bateman* 3141-3146——Insufficiency of the space generally for freedom of working, *ib.* 3232——Necessity of a space of about fifteen inches round a pipe in making lead joints, *ib.* 3347-3349.

Necessity of a space of from twelve to eighteen inches round each pipe, according to its size, in order to admit of inspection and repair, *Muir* 3476, 3477. 3657-3664. 3749-3753——Space in excess of thirty-six inches required for a thirty-six inch pipe, that is allowing for the metal of the pipe and for the sockets; at the sockets the space would be forty-four inches, *Hersey* 4067-4069. 4082-4085——Necessity in making a trench for a thirty-six inch-pipe, of having two feet round the barrel of the pipe, and about eighteen inches outside the sockets, *ib.* 4075-4077.

Necessity of about fifteen inches space round a 12-inch pipe in repairing it, *Brothers* 4275-4277——Inadequate size of the London subway now constructed, or as proposed to be constructed; that is, with reference to the space to be required over a course of years, *Hawkesley* 4975-4977. 5034——Great liability to accident and explosion if the pipes are crowded together, *ib.* 4978——Space required round the pipes in order to make repairs, *ib.* 5027-5029.

Care promised to be taken by the Metropolitan Board as to the sufficient dimensions of any future subways, *p.* 95.

See also *Covent Garden Subway*, 1. *Enlargement of Subways. Mansion House-street. Nottingham. Southwark-street Subway*, 1. *Valves* (*Water and Gas Pipes*).

Sockets (*Gas-pipes*). Width of the sockets for the various sizes of pipe, *Hersey*, 4085.

SOUTHWARK-STREET SUBWAY:

1. *Generally as to the Capacity of the Subway with reference to the Number and Size of the Pipes to be placed therein.*
2. *Length.*
3. *Ventilation.*
4. *Cost.*
5. *Question of Gas Leakage.*
6. *Flooding of the Subway.*
7. *Question of a Settlement of the Subway.*
8. *Other Evidence and Particulars generally.*

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SOUTHWARK-STREET SUBWAY—continued.

1. *Generally as to the Capacity of the Subway with reference to the Number and Size of the Pipes to be placed therein:*

The Southwark-street subway has somewhat smaller dimensions than that near Covent Garden, *Bazalgette* 107.

Plans produced and explanation thereof, relative to the Southwark-street subway, and the number and position of the gas and water-pipes necessary to be introduced into it, *Innes* 1959-1977——There would at first be at least three gas-pipes and three water-pipes, *ib.* 1963-1965——Insufficient provision made by the subway for the cross-pipes that are unattached to the longitudinal ones, *ib.* 1970-1978.

Belief as to the insufficiency of the subway generally for the increased number of pipes likely to be required in it by the Phœnix and other companies, *Innes* 1979-1981. 2018-2024. 2166-2203——Inadequacy of the present apertures in the subway for the admission of the larger gas and water pipes to be introduced, *ib.* 1982-1989——Difficulty in turning large pipes in the subway, *ib.* 1990-1995.

Examination with further reference to the probable number, position, and size of the pipes to be introduced into the subway by the Phœnix Company and by water companies; plans on the subject further adverted to, *Innes* 2166-2203. 2262-2302. 2369-2403. 2437-2452——For one-half the length of the new streets there would be two water companies, the Southwark and Lambeth, and for the other half the Southwark Company only, *ib.* 2262-2266. 2437-2452.

Evidence relative to the insufficiency of the Southwark subway, as the street will probably be a leading thoroughfare, and several large pipes will be required, *Simpson* 2945-2976. 3025——Question as to the mode of laying the pipes in the Southwark subway considered with reference to the size of the subway, *ib.* 2987-3006. 3023-3033——Prospect of more than one large gas-pipe being carried through the subway, *ib.* 3076-3078——Two large water-mains would be sufficient for the supply of the new street itself, *ib.* 3090-3093.

Opinion as to the sufficient size of the Southwark-street subway for both water and gas-pipes, *Bateman* 3392, 3393.

Difficulty as to the facilities for a proper inspection and for repairs in such a subway as that in Southwark-street, with leading mains in it, *Muir* 3469. 3476——Grounds for the conclusion that the Southwark-street subway is insufficient in size for the accommodation of the pipes likely to be required in such a leading thoroughfare, *Hersey* 3821-3837. 3936-3944——Inadequate space in the subway for the purposes of repairs, *ib.* 3831, 3832.

Probability of a 36-inch water-main being carried through Southwark-street, *Greaves* 4384-4391. 4404-4408——Examination upon the question of the adequacy of the Southwark-street subway with reference to the water and gas-pipes to be required, not only for the street itself, but for districts beyond; reference to certain plans hereon, *ib.* 4401-4411.

2. *Length:*

The length of the subway in Southwark-street is 3,292 feet, *Bazalgette* 109.

3. *Ventilation:*

Very good ventilation in this subway, *Marrable* 500, 501. 606——With regard to the good ventilation of the subway, this is not facilitated by the side entrances, which are bricked up until the houses are built, *ib.* 614-621.

Want of ventilation in the Southwark subway; means by which this want may readily be supplied, *Innes* 1996-2000. 2008. 2352-2355. 2456-2462——The ventilation of the subway is insufficient, *Brothers* 4246-4249.

4. *Cost:*

Belief as to the vaults along Southwark-street costing 7*l.* 18*s.* per foot, *Bazalgette* 253-261——Statement showing that the cost of the subways and side passages in Southwark-street is 3*l.* 12*s.* 6*d.* per foot run, *ib.* 1585-1594——Increased cost of the subway on account of the more expensive bricks used, *ib.* 1587. 1590. 1602-1607——The vaults in Southwark-street came to about 2*l.* per foot, *ib.* 1591.

Estimate of 7*l.* 10*s.* per foot as the cost of a subway in Southwark-street, sufficiently large for all the pipes likely to be laid there, *Simpson* 2745-2751——Large cost of the subway adverted to, *Hersey* 3838, 3839.

5. *Question of Gas Leakage:*

Absence of any leakage from the gas pipes in the Southwark-street subway, *Marrable* 496-499——Circumstance of there being now two leakages of gas in the Southwark-street subway, *Greaves* 4339, 4340——Statement as to witness having recently found a distinct smell of gas in the Southwark-street subway, where a pipe crossed it transversely, *Haywood* 4576-4584.

6. *Flooding*

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6. *Flooding of the Subway:*

Circumstances under which the Southwark subway was flooded some few months ago *Simpson* 3081–3089.

7. *Question of a Settlement of the Subway:*

There could not be any settlement in the Southwark subway affecting the pipes, *Bazalgette* 287–291. 358–360.

8. *Other Evidence and Particulars Generally:*

The Southwark-street subway is on the same principle as that at Covent Garden, *Marrable* 435. 437——Circumstance of the powers now sought for not having been introduced into the Bill for the new street in Southwark, *Tite* 711–715——Absence of difficulty in carrying the supply of gas across the Southwark subway, *Innes* 2433.

Character of the difficulty as regards the water pipes in the streets running at right angles with, and intersected by, the Southwark subway, *Simpson* 2866-2881——Necessity of all the arrangements in connexion with the subway being completed and in operation before its practical utility can be proved, *ib.* 3041-3045——Probability of the Southwark and Vauxhall Company supplying much the greater part of the new street, whilst the Lambeth Company may supply only a small portion of it, *ib.* 3051-3075——Convenience of the street itself for carrying the pipes of the companies along, *ib.* 3079, 3080.

Advantage of the water companies being able to carry mains along Southwark-street, *Muir* 3798–3801——Doubt as to the amount of advantage to the local water companies in being able to carry their pipes along the new street in Southwark, *Greaves* 4412–4417——Doubt as to the fairness of making the companies pay for taking mains through the Southwark-street subway in order to supply other districts, *Hawkesley* 5072–5080.

See also *Phœnix Gas Company.* *Ventilation.*

Southwark and Vauxhall Water Company. Petition by this company against the Bill, *p.* 1.

See also *Southwark-street Subway*, 1.

Stephens, John Samuel. (Analysis of his Evidence.)—Is out-door superintendent of the City of London Gas Works, 4859, 4860——There are three gas companies having pipes through the City, 4861–4864——Power of the City of London and Great Central Gas Companies to supply the new street about to be made from Earl-street to the Mansion House, 4865, 4866—— Statement as to the several mains and small pipes which would probably be required in a subway under this street for the supply of gas and water, 4867–4887. 4898-4911——Obstruction caused by the subway in this street running transversely with the mains and pipes in Earl-street, near Blackfriars, and at other points, 4867–4871. 4904–4912.

Calculation that a space of from twenty-four to twenty-six feet is required in the proposed subway for all the pipes to be laid in it, 4884–4886——Width of the new street and depth of the subway adverted to with reference to the length required for the service pipes; increase of expense on this score, 4887-4897——Witness hands in a statement of several accidents or explosions from leakages or escapes of gas in the district supplied by the City of London Company; large proportion of these explosions which occurred in sewers, 4913, 4914.

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Stephenson, Robert (the late). Concurrence of the late Mr. Stephenson in witness's objections to subways, more especially as regards gas pipes, *Hawkesley* 4958.

Strand District. Aggregate of 9,474 openings in the Strand district from May 1859 to May 1864, *Fry* 30–35. 58.

Street Openings. See *Openings in the Streets.*

Suffocation of Workmen. Case of a man suffocated whilst working inside a 36-inch pipe from a very small escape of gas in the pipe, *Hersey* 4035–4040——Danger of suffocation of workmen from escapes of gas in sewers and subways, *Belgrand* 4683–4686.

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Tarbotton, Marriott Ogle. (Analysis of his Evidence.)—Civil Engineer; is Surveyor to the Corporation of Nottingham, 1281, 1282——Has for many years devoted his attention to the subject of subways as a means of obviating the continual breaking up of the streets for gas and water-pipes, &c., 1283–1287——Advantage of the facility with which gas-pipes can be laid in a subway, and can be inspected there, 1288——Importance of the ready detection of gas leakage in subways, such leakage arising chiefly at the service pipes, 1288. 1292–1295——Absence of any vibration of the pipes, 1290, 1291——Less corrosion in a subway than in the ground, 1292——Good ventilation in the subways at Nottingham and in London, 1269.

Perfect security with which water mains may be laid in subways; absence of any contamination from the gas-pipes, 1297. 1362–1364——There is no need for the pipes being constructed in any complicated or expensive manner, 1298——Sewers may with every facility be laid under the subway without any interference with the pipes, 1299——Means by which a street with a subway may cross at right angles another street without a subway, 1300. 1413, 1414.

Detailed explanation of the subways formed in two new streets at Nottingham under the superintendence of witness; several advantages thereof with reference to the gas and water-pipes laid therein, 1301 *et seq.*——Means for the ventilation of these subways; sufficiency thereof, 1305. 1316–1321. 1350–1356——Adequate width of the subways, though considerably narrower than that near Covent Garden, 1322. 1473——Arrangements contemplated in regard to a third subway at Nottingham, where the depth is limited, 1322.

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Absence of difficulty in so constructing and arranging a subway that it may contain several pipes for various purposes, 1365–1367. 1500——Calculation showing a very considerable economy by using subways instead of laying down pipes in paved streets, 1368–1386. 1402–1407——Large saving on the score of gas leakage on account of the facilities afforded by subways, 1387–1390——Saving also to the water companies, there often being a large waste of water under the present system, 1390, 1391.

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Calculation that the subways in Nottingham, if constructed of new materials in an ordinary street, would have cost about 3*l.* 11*s.* 6*d.* per yard; this is exclusive of the cost of the side passages to the houses, 1444–1450——Way in which two or more water-mains of very large dimensions might be laid in a subway, 1451–1459——Larger means of ventilation provided in the subways at Nottingham than in London, 1460–1466——Facility of enlarging the subways now made in London if found too contracted, 1474–1476.

Further statement as to the saving by the use of subways, although in the mere act of laying the mains, the economy might not be much, 1477–1480. 1483–1486——Great economy on the score of leakage of gas further adverted to; difficulty in stating the present loss by leakage, although it is doubtless very great, 1486–1499——The water and gas services in the Nottingham subways have been in full operation for twelve months and more, 1503, 1504. 1507.

Telegraph Wires. Telegraph wires might be placed in subways with advantage to the public, *Haywood* 4536. 4542–4544——Facility of arrangements for conveying the telegraph pipes through the streets, *Hawkesley* 5046.

Thames Embankment. Authority obtained by the Metropolitan Board for the formation of a subway in connection with the new street comprised in the Thames Embankment Scheme, *Bazalgette* 78. 83–87——Enlarged dimensions contemplated for the subway in connection with the Thames Embankment and new street in the City, *ib.* 137–140——Statement as regards the subway, that the total cost will be something less than 3*l.* per foot, or 1*l.* 10*s.* on each side, *ib.* 295–307.

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1. *Evidence favourable to Subways for Water-pipes and Mains.*
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1. *Evidence favourable to Subways for Water-pipes and Mains:*

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